Reports from 3 Conferences

Rapports de trois Conférences
Berichte von drei Konferenzen
Reportajes de tres conferencias

INTERNATIONAL Railway Journal

January 1961

Building Mexico's Newest Railway

Le chemin de fer le plus récent au Mexique

Der Bau der neuesten Eisenbahn in Mexiko

El ferrocarril más moderno de México.

Rotterdam's Rail Progress

Le progrès du rail à Rotterdam

Fortschritt der Eisenbahn in Rotterdam

Progreso ferroviario en Rotterdam

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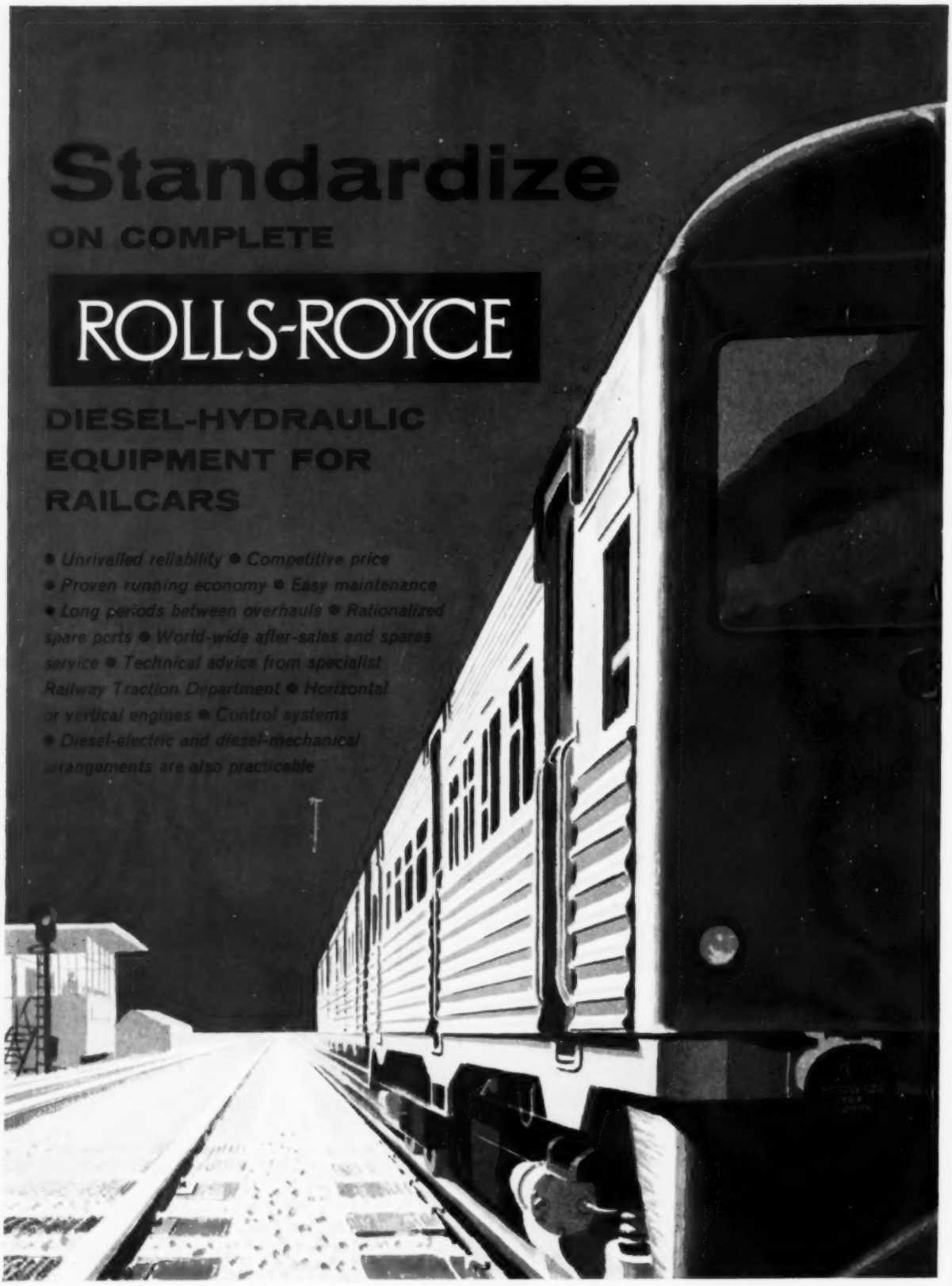

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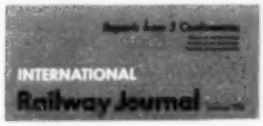
January 1961



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WORLD REPORT

CHINA: Joint offices have been established by the administrations of the state railroads, iron and steel plants, and coal mines in an effort to plan more efficient transportation of coal. In the six weeks between 1 October and 15 November 1960, 50,000 more tons of coal and iron ore were transported daily than during September. This is a part of a nation-wide campaign begun during September to raise the volume of freight being hauled. What is described by the Chinese press as a "gigantic nation-wide effort" is being made to improve the freight-handling capacity of 70 key railroad stations. Plans call for the reconstruction of existing rail hubs, freight yards, branch lines, and the stations themselves. The program was begun at Fusin station in Northwest China where a bottleneck in the movement of coal from the near-by mines had developed. The Tientsin railway hub has doubled its loading and unloading capacity after reconstructing the 95 special lines to local factories and docks. The Chinese press reports that railway workers have considerably speeded up the loading and unloading of freight cars throughout the country by using simple inclined chutes between loading sheds and cars. This method is now said to be employed for 80 per cent of the non-fragile items. At the Houma station of Shansi province it now takes ten men only ten minutes to load the same amount of coke which previously required 24 men three hours.

PANAMA: A large tract of land formerly used as the Pacific terminal of the US Government-owned Panama Railroad in Panama City, has been turned over to the Republic of Panama. Following an earlier similar transfer of the Atlantic terminal properties at Colon, all but a few short spurs of the railway line will operate entirely within the Canal Zone.

GREAT BRITAIN: The first moving walkway, or "Travolator", has been installed in London's Bank Station. The installation, first of its kind in Europe, is built on an incline of 1:7, has a maximum speed of 55 meters per minute, and can handle 10,000 passengers hourly. The 96-meter moving walkway connects the ticket office and entrance hall of the station with the platforms through a tunnel whose rush-hour congestion earned it the uncomplimentary name of "The Drain". Speeded-up handling of passengers enables British Railways to operate 17 more rush-hour trains from the station.

PHILIPPINES: Plans for financing the extension of the Manila Railroad to Cagayan and Sorgoson have reached the final stages. President Garcia has announced. MRR general manager Teofilo Zosa was to conclude arrangements with two firms submitting acceptable bids for the work.

RHODESIA: Centralized Traffic Control has been put into operation on the 79-km main line section between Makwiro and Gatooma.

JAPAN: Japanese National Railways officials have begun moves to remove billboards from JNR right-of-way and stations. Although display advertising contributes 1000 million Yen annually to JNR revenues, the move is being made improve the appearance of railway property.

IRAQ: Mohammed Habba, head of the country's Railway Development Board, recently visited the Soviet Union to review progress being made by the USSR's Ministry of Transport Construction for the standard-gauging of the present Baghdad-Basra meter-gauge line. The plans are being prepared under terms of a bilateral agreement signed in 1958. The plans for the project were to be completed by the end of the year. Preliminary work and the acquisition of new right-of-way is now under way. In addition, new meter-gauge lines from Baghdad West to Daurah and Basra to Rabat, are planned, with an anticipated cost of 700,000 Dinars. New rolling stock is also to be acquired.

CUBA: The government of Cuba, under a decree law dated 14 October 1960, has assumed control of the Consolidated Railways of Cuba: Hershey Terminal Railway; Cuba Railway Company; Northern Railways of Cuba; and Guantanamo and Western Railway. A subsequent decree added the Hershey Cuban Railway and the Puerto Padre Railway.

SWITZERLAND: Receipts from the Swiss Federal Railways are likely to break all previous records if the trend set earlier in 1960 continued to the end of December. In the first eight months of 1960 19.2 million tons of freight were carried—equal to 96,000 tons or 12,500 car loads a day. This is 17 million tons up (9.5 per cent) over the best previous year (1957). Passenger traffic was down 0.4 per cent from 1959 with 148.9 million persons carried—an average of 610,000 daily.

CZECHOSLOVAKIA: The official publication of the Czech Ministry of Transport, *Doprava*, in reviewing the progress of the Organization for Railway Cooperation (ROC) since its founding in 1956 as the sole international body dealing with rail transport in Albania, Bulgaria, China, Czechoslovakia, East Germany, Hungary, Mongolia, North Korea, North Viet Nam, Poland, Rumania and the USSR, commented: "In the present times when the socialist division of work and foreign trade both within the socialist systems and with the capitalist states is being developed, the role of transport, especially rail transport, assumes exceptional importance in international relations."

GUINEA: The 40 Soviet engineers who have been sent to Guinea to survey the rehabilitation of the Conakry-Kankan rail line (see IRJ "World Market", October 1960) are expected to have a completed proposal prepared by March, with detailed plans for reconstruction and replacement of obsolete equipment. Soviet sources claim rehabilitation is necessary because the former French-owned line was built "without elementary technical standards being observed and . . . has become extremely dangerous." The same sources also charge that the French failed to leave Guinea any technical documentation on their departure.

CHINA: Over 1350 km of new rail line were built in China during the first six months of 1960, it is reported. An additional 2000 km of grading and substructure are reported ready for the laying of rails. The 1400-km line into Tibet from Si Ning, to be the highest railway line in the world with altitudes of up to 4500 meters, was expected to be complete by the end of 1962, and service on the new "Friendship Line" between China and the Soviet Union was established as far as Urumchi, and rails and bridges on the last 510-km stretch to the Soviet border were to be installed by year's end. The Soviet portion of the line was recently completed. Total new line expected to be finished in 1960 was 4300 km, together with double tracking of 1360 km and reconstruction of 400 km of existing line.

AUSTRALIA: The New South Wales Government Railways have introduced the first fully-mechanized track maintenance program in Australia. The scheme covers 532 miles of track in outback New South Wales including the world's third longest straight stretch between Nyngan and Bourke, 186 km. Two specialized gangs have been set up to handle the replacement and resurfacing. The former will cover the whole area on a four-year basis and the latter on a two-year cycle. A second resurfacing gang will be established later this year. Smaller maintenance gangs based at larger towns attend to individual sections. All gangs have been supplied with the latest types of track maintenance equipment to handle particular tasks. The new project is being used as a pilot undertaking and will be altered and amended to suit the unusual conditions found in Australia before similar schemes are established in other areas of the NSWGR's operations.

EUROPE: New international car-sleeper services to operate this summer include Düsseldorf-Avignon and Paris-Milan. The former will operate once a week in each direction. The latter will run twice a week in each direction. Once weekly it will connect with an Italian car-sleeper running between Milan and Brindisi. At Brindisi there is a connecting ferry boat service to Greece.

ALBANIA: The railway system of Albania is to be extended under terms of the country's third five-year plan. The present 120-km main line was built in 1947, now handles 2000 tons of freight daily. Passenger traffic has reached approximately 2.5 million annually. The port of Durres is to receive new equipment to meet increasing traffic.

BELGIUM: The Belgian National Railways are now preparing to electrify—at 3000-volts AC—the line from Brussels via Mons to the French frontier at Quévy. French Railways are electrifying—at 25 kv AC—the line from the border to Paris. Multi-frequency locomotives capable of running on either electrical system will haul trains when electrification is completed. Electric traction is expected to reduce the journey time between the two capitals by 30 minutes.

INDIA: Prime Minister Nehru inaugurated the rail and structural steel mill of the Bilhai steel plant on 27 October. The mill, the third of the four rolling mills at the Bilhai Works, will produce some 484,000 tons of rails, railway sleepers, and structural steel sections annually.

SOVIET UNION: Kiev's first subway line, nearly 6 km in length, was opened 22 October. Linking the Ukrainian capitals' four districts, the line is the Soviet Union's third underground railway. A second line is now under construction in Kiev.

RHODESIA: During the twelve-month period ended 30 June Rhodesian Railways traffic reached a record figure of 11,702,537 tons. Passengers carried dropped approximately 300,000 from the 1958-59 total.

JAPAN: The ministries of transport, agriculture-forestry, international trade, and industry, as well as other Japanese government agencies, have set up an emergency coordinating committee to deal with a backlog of unshipped rail freight estimated to have reached 4.5 million tons during the October-December quarter. Demand for rail freight was expected to reach an estimated 55.8 million tons during the quarter, while the maximum capacity of the Japanese National Railways is 51.9 million tons. A record rice crop, heavy fish catches, and heavy coal shipments for electric power plants account for the squeeze on JNR capacity. Purpose of the special committee is to establish priorities for freight shipments. Top priority is to be given to commodities whose steady movement is needed to maintain stable market prices. Meanwhile, JNR officials announced that total freight carried during the month of September would reach 16,200,000 tons, highest monthly figure in the railways' history.

CONTINUED ON PAGE 18

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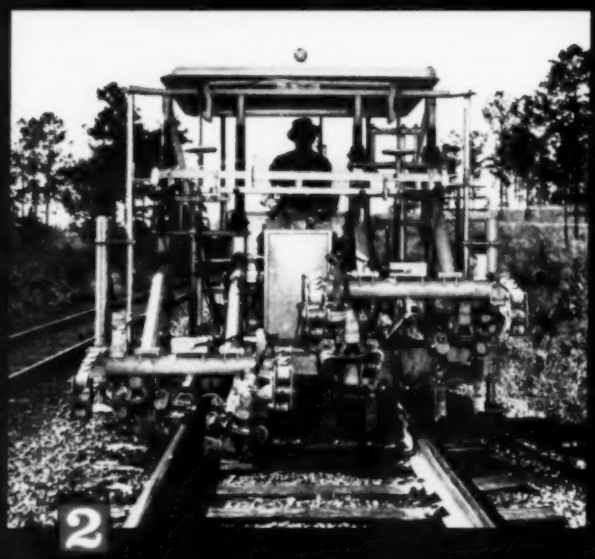

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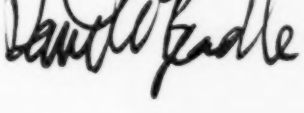
Short Lines . . . . . .

WRONG NAME?—I have just been reading over the publisher's letter, "A Prototype and a Promise," in our October issue. I was particularly struck once again by its opening line, "There is a ferment of transportation development all over the world." Reading that line, and reading through this issue and the last, the reports of new construction and modernization, I began wondering whether we hadn't given IRJ the wrong name. Now, there is nothing wrong with "International Railway Journal." It's a good, factual name that describes the magazine exactly. I simply got to thinking of another railway magazine and the name its founders chose in the late nineteenth century. I am proud to be associated with that magazine, which is the direct parent of this one, but I do think it's too bad that the founders couldn't have saved the name for this one instead. Competition to the contrary, certainly we are living in the midst of the Railway Age.

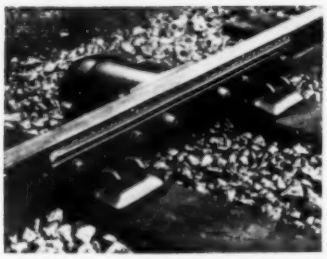
SPEAKING OF WHICH—The title of that publisher's letter was not lightly selected. It could, in fact, well be the permanent motto of IRJ. For the very word "prototype" implies that the item in question is not a production model. And it is my personal hope that IRJ never becomes a production-line magazine, stamped out month after month like so many tin cans. As a matter of general policy IRJ is in favor of automation—but at the same time, we have no intention of producing an automated publication. To the greatest possible degree, IRJ will continue to search for ways to be constantly more informative, more readable, and, most of all, more useful. In this connection, your suggestions and criticisms are earnestly solicited, always. IRJ is new; we hope it will always be "new."

GREEN STEAM AND NARROW-GAUGE BEER—The affairs of Rotterdam (see page 20) move entirely too fast for comfort, especially when it comes to reporting them promptly. Just after the final draft of this month's story went to the printer, the news came that the city and the privately-owned RTM tram and bus system had reached tentative terms for purchase by the municipality. It is what some of my countrymen would term "a natural;" the RTM serves precisely the part of the area that is growing most vigorously. In all the progress, though, I hope the municipal owners retain some of the flavor of the line as it is now. I have a fondness for locomotives with names, and the RTM's homemade diesels, named after birds, are favorites of mine. So are the little immaculately-kept green tank engines, and I will issue an advance appeal to Rotterdam to keep at least one of them on the property, if only for the annual "kindertram" trip to the seaside that the RTM management operates each summer. And lastly, the demise of the narrow-gauge buffet cars, with their pleasant hostesses, would be sorely missed.

ODDS AND ENDS—My thanks to Machinefabriek "Breda" for the little "Stoomtram" that heads this column. They built a good many of these little "murderers" in their day, and kindly loaned me the drawing.

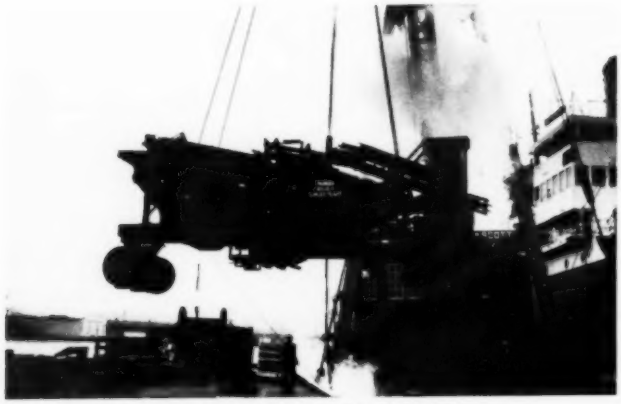


Wherever there are railroads



P. & M. Rail Lubricator

The FAIR Rail Anchor



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RÉSUMÉ

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RESUMEN

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World Market

▶ *Argentine State Railways.*—Asked for bids for 10 diesel electric passenger locomotives.

▶ *British Railways*—Have ordered an additional 50 1700-hp type 3 diesel-hydraulic units from Beyer-Peacock (Hymek) Ltd. The order is in addition to one already placed for 45 units. BR has awarded a contract for 98 sets of engines and transmissions for incorporation into 350-hp diesel-electric shunters to English Electric; the shunters, of the same type now numbering about 1150 units in BR service, are to be built in the BR's Horwich and Darlington works. Earlier English Electric orders include 200 type 4 2000-hp diesel electrics, of which 100 have already been delivered, and 22 3300-hp "Deltic" units.

▶ *Chihuahua al Pacifico*—Has ordered one 1200-hp and nine 1600-hp diesel electrics from Fairbanks-Morse. (See "Railway of the Month", page 32).

▶ *Chilean State Railways*—Will inaugurate a rehabilitation and expansion program costing an estimated 265 million escudos ($250 million); approval of the program was announced by the Under Secretary of Transportation. Included in the planned purchases will be 113 diesel locomotives, rolling stock, signalling and communications equipment, and other material.

▶ *Commonwealth Railways (Australia)*—Have taken delivery of the first of 12 passenger cars, including six sleeping cars, built by Kinki Rolling Stock of Japan. The cars are the first passenger cars for Australia to be built by Japanese industry.

▶ *Colombian National Railway*—Received bids during December for the supply of 155 bogie box cars, 50 open gondola cars and 35 flat cars, all of 35-ton capacity for 914-mm gauge; cars are to be paid for with proceeds of a recent World Bank loan for railway rehabilitation and modernization (IRJ "World Market", October 1960).

▶ *Egyptian Republic Railways*—Have awarded a contract for 13 electric railcars to Kinki Rollings Stock of Japan; asked bids for supply and delivery of suburban diesel trains, including 40 second-class coaches with driving compartments at either end, 40 first-class trailer coaches with one driving compartment, 20 second-class intermediate trailers without driving compartments, and spare parts.

▶ *Greece*—A refrigerator car of the Interfrigo pattern is being built in Greece by VIAMAX of Athens. Hitherto this firm has restricted its production to bus bodies and frames, but if the prototype car is satisfactory a production order is anticipated. The Greek Ministry of Commerce is taking a close interest in the project as the demand for refrigerator cars is increasing as Greek exports increase.

▶ *Hungarian State Railways*—Have ordered 380 open two-axle freight cars of standard ORE type 2 design from Werkspoor of Holland. In the discussion stage are modifications permitting the interchange of axles for through service with the broad-gauge Soviet railway system. The purchase will be made through Nikex, the Hungarian government export-import organization.

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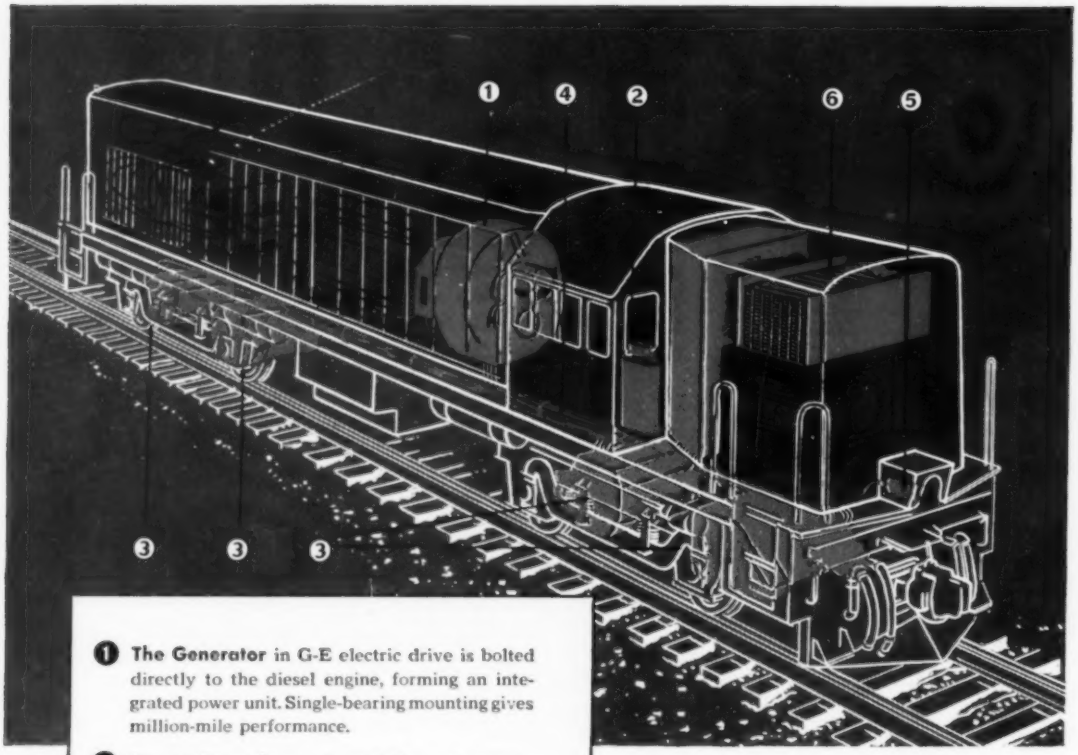

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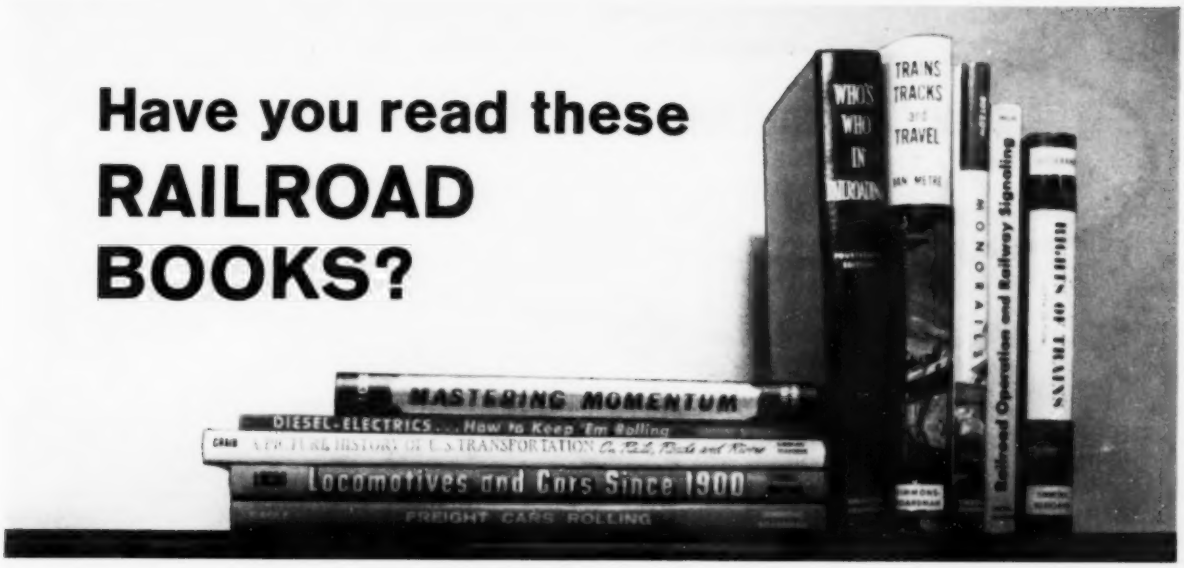

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RESUMEE

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(Inserate für die Märznummer müssen vor dem. 1. Februar eingesandt werden).

RESUMEN

Nueva oportunidad ofrecida a los abastecedores ferroviarios para vender en el mercado internacional. Ahora cada anuncio puede llegar a 10,000 dirigentes ferroviarios en todo el mundo... y de un modo económico y eficiente, en *una sola* revista. International Railway Journal es leída prácticamente por todos los grupos ferroviarios de más de 50 países. IRJ es una revista internacional *autónoma* (no una edición extranjera de alguna revista norteamericana) que se publica en inglés con resúmenes en español (como éste), francés y alemán. Aproveche esta excepcional oportunidad para aumentar la distribución mundial de sus productos para ferrocarriles. Reserve espacio para su anuncio en 1961, pero hágalo sin demora. Las reservaciones para el número de marzo se cierran el primero de febrero.

INTERNATIONAL RAILWAY JOURNAL

World Market CONTINUED

▶ *Indian Railways*—Are negotiating with a three-company Japanese syndicate composed of Hitachi, Toshiba and Mitsubishi Electric for the supply of 42 AC industrial-current locomotives; have invited tenders for overhead installations on 330 km of track between Sealdah and Ranaghat and between Dum Dum Junction and Bogaon. Bids will be received until 15 February, and tender documents can be obtained from the General Manager and Chief Engineer, Railway Electrification, 232 Lower Circular Rd., Calcutta 20, for the equivalent of $21 per set.

▶ *Indonesian Railways*—Have announced a seven-year locomotive and rolling stock purchase program. By 1967 the railways plan to have 1119 diesels in service. First order under the program was for 75 locomotives to be built by Krupp of Germany.

▶ *Iraqi Republican Railways*—Will award contracts for 120 km of 38-kg/m rail, 90 km of earthworks.

▶ *Jamaica Railway Corporation*—Has awarded a contract for 17 railcars to Metropolitan-Cammell; the cars are to be fitted with Rolls-Royce engines, first deliveries are expected in 1962.

▶ *Japanese National Railways*—Have announced plans for the purchase of 1000 passenger cars over a five-year period for tourist and sightseeing services. Equipment will reportedly be in trainsets of the "Kodama" type.

▶ *London Transport Executive*—Has placed orders for 619 aluminum tube cars. This brings orders for the 1959 "Silver" tube cars to 1208 units. The order for additional cars went to Birmingham Railway Carriage and Wagon Co. (450 cars) and the Derby works of British Railways' London Midland Region (169 cars).

▶ *Mocambique Harbors, Railways and Transport Services*—Has invited bids for the supply of 65 40,000-liter gasoline tank cars for 1.067-meter gauge. Bids will be received until 2 February by the organization, and bid documents may be obtained by writing to the General Storekeeper, Laurenco Marques. Bids must be in Portuguese.

▶ *Nigerian Railway Corporation*—Will relay 123 km of 35 kg/m rail and 43 km of steel sleepers in its eastern division. The project is the first stage of an overall rebuilding program which will extend over 965 km of the company's system, and is expected to cost approximately £9.3 million. Rail to be replaced has been in use for 36 years, and track reconstruction will permit increased train speed and axle load, and reduce maintenance costs. Rail, sleepers and fittings for the first 123-km segment will be procured with the proceeds from a $3 million loan from the Development Loan Fund, guarenteed by the Federation of Nigeria.

▶ *Ponce and Guayama Railroad*—Will consider proposals for two diesel-hydraulic meter-gauge locomotives capable of handling trains of 900 metric tons at 30 to 40 km/h on level track with a maximum axle load of 10 metric tons. Inquiries should be addressed to Kenneth H. Gordon, Acting Manager, Aguirre, Puerto Rico.

CONTINUED ON PAGE 69

WORLD POLL

The multiplicity of screw-thread standards in use throughout the world is a considerable problem to the railway and railway-supply industries. To a lesser but still appreciable extent, so is the existence of two different and unrelated systems of measurement, metric and "English". This is the clear indication produced by International Railway Journal's World Poll survey. Clear too, is that the problems will grow rather than diminish unless and until a much higher degree of international standardization is achieved.

La multiplicité des étalons de filets de vis en usage à travers le monde, constitue un problème considérable pour les chemins de fer et ses fournisseurs. D'importance moindre, mais pourtant appréciable, est l'existence de deux systèmes de mesurage, différents et n'ayant aucun rapport: métrique et "anglais". C'est ce qu'a démontré clairement le référendum mondial tenu par l'International Railway Journal. Il est également évident que les problèmes semblent s'accroître plutôt que de diminuer, à moins de parvenir à un degré de standardisation plus élevé et jusqu'à ce que ce point soit atteint.

Die Vierfalt der in aller Welt angewandten Schraubengewindenormen ist ein grosses Problem für die Eisenbahn- und Eisenbahn-Ersatzteil-Industrie. Geringer, aber immer noch bemerkbar machen sich auch die beiden verschiedenen Masseinheiten des CGS- und des "englischen"-Systems. Dieses kam bei einer Umfrage der International Railway Journal deutlich zum Ausdruck. Deutlich ist auch, dass diese Problems eher grösser als kleiner werden, wenn nicht ein sehr weitgehende internationale Normung erreicht wird.

Para los ferrocarriles y las industrias ferrocarriles la multiplicidad de las normas de las roscas constituye un problema muy serio. La existencia de dos sistemas diferentes de medición, el sistema métrico y el sistema inglés, trae consigo las mismas dificultades, aunque menores. Esto se desprende de la encuesta mundial realizade por la International Railway Journal. Resulta también que las dificultades muestran tendencia de aumentar, hasta que se haya realizado una normalización internacional más grande.

What is behind the problem, what makes it more serious than it was? From the survey replies, the answer that emerges is twofold: the supply industry is making a vigorous effort to broaden its market, especially in the field of exports; the railway industry in much of the world is breaking away from traditional buying practices that rely solely on equipment from a single nation.

How severe is the problem, and what are some of its ramifications? To find out International Railway Journal questioned railway and manufacturers throughout the world.

The Railways

Railway purchasing officers were asked what system of measurement and what screw thread series were standard on their railways; whether other standards were used in actual practice; what problems this created in inventories, purchases, maintenance and training; and whether the question of standards influenced their choice of suppliers. They were asked, too, for proposed solutions and general comment. Here are some of the answers.

• **Antofogasta (Chili) and Bolivia Railway:** Both English, metric measurements standard and in use. American and BSW threads are used but Whitworth is standard. Majority of equipment is English measure, BSW threads. Finds little problem because of small amount of material with other than English-BSW standards. Notes a problem not mentioned by others, trouble with motor windings due to differences in wire gauge standards. Choice of suppliers not affected.

• **Central Railway of Peru:** English measurements and Whitworth threads exclusively, no problems, no effect on choice of suppliers. "A multiplicity of standards is not necessary or desirable in locomotive engineering as BSW has always been eminently suitable for such work. All locomotives working on this railway are British-built."

• **Chilean State Railways:** Metric measurements standard; metric and Whitworth threads used for bolts, American Standard on brake piping. Equipment actually in use is chiefly metric with Whitworth threads. Question has some influence on choice of suppliers, increases inventory and parts-purchasing problems but is less of a problem in maintenance and training. Solution: "To use exclusively the metric system."

• **Coras Iompair Eireann (Irish Transport Company):** English measurements and BSW threads standard; equipment in use or on order employs metric, Whitworth and American Standard threads. Providing for all adds considerably to problems of both inventory and operation. "Stocks of spares, tools, spanners, etc., have to be held for each type. It would be desirable to have one standard if this were possible."

• **Ghana Railways and Harbours:** English measurements, Whitworth threads are standard, but metric measurements and threads are in use. No problems reported but "Employees are trained in English and metric measurements."

• **Mocambique Railways:** Both English and metric measurements, metric and Whitworth threads, but says "No problem."

• **Paulista Railway:** Most equipment uses Whitworth threads, but metric and American Standard are used as well. Metric measurements are officially standard in Brazil but because most equipment is of non-metric origin

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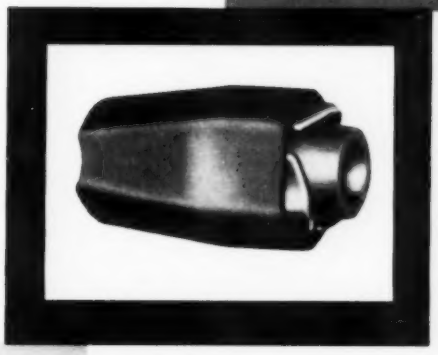

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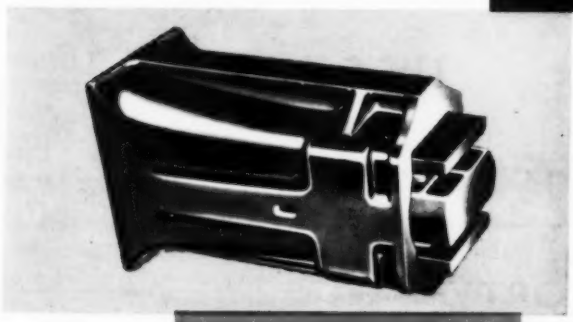

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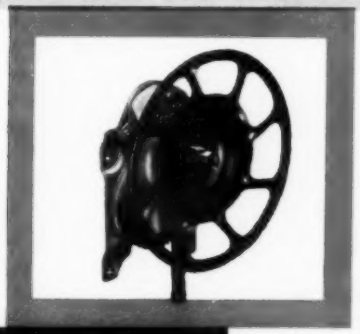

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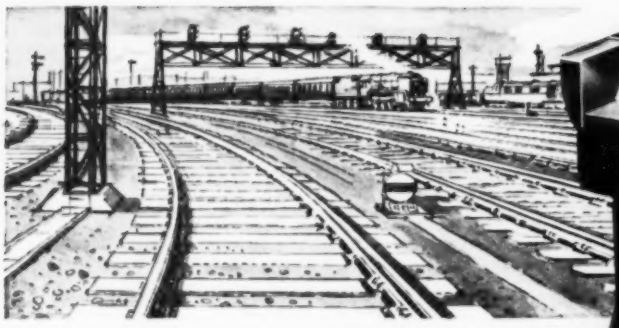

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WORLD REPORT CONTINUED

SOVIET UNION: The Soviet ministries of transport and transport construction have drafted a detailed long-range program for railway construction to cover the next 15 to 20 years. Included in the proposed plan are rail lines for the development of the large Lower Angara, Aldan and Rudnogorsk iron ore deposits; others in connection with the construction of hydro-electric projects on the Angara-Yenisei Cascade; for lumbering development in Eastern Siberia, the Urals and the European north; and for improvement of communication with the Yakutask industrial region. The report, which has been submitted to the State Scientific-Economic Council for examination and approval, also indicates that the ministries consider the one rail link between Central Asia and Central Russia to be overtaxed, and states that there is increasing need for a main-line route between Alexanderov-Gai and Chardzhou. Included in the plan are some 50 new lines to be built in Siberia, totalling over 19,000 km. Meanwhile reports of progress in the accomplishment of the railways' Seven Year Plan, which would be replaced by the new long-range plan, state that 2142 km of existing line were electrified, including the last sections of the 5000-km Moscow-Irkutsk line.

JAPAN: Japanese National Railways officials have announced that 200 km of right-of-way have been acquired for the 500-km standard-gauge Tokaido line; construction has already begun on 102 of the 200 km. The 7.9-km Tanna tunnel has reached about 4 km to date, and is expected to be finished by late 1961. In other Japanese railway news, Hokkaido Realty Co. has filed an application to build the country's first commercial monorail line serving the Nikko area from Tokyo; the project, together with an extensive tourist-development program for the Nikko area, is regarded as a direct challenge to the Tobu Railway, which has had a virtual monopoly on Nikko tourist trade.

GERMANY: The 1962 Railway World Congress, sponsored by the Association Internationale du Congrès des Chemins de Fer (AIC), will be held in Munich from 24 June to 4 July. The German Federal Railways will be host to the gathering, expected to draw 1200 delegates from 50 nations. Main subject of the congress, to be held in the Deutsche Museum, will be current freight, passenger and operational problems, as well as new technical developments.

CONTINUED ON PAGE 68

Capital Expenditures: II

Since the publication of International Railway Journal's World Poll of planned capital expenditures in the October issue, the following reports of spending plans have been received. As the plans of other railways are established and made public, IRJ will report them in subsequent issues.

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SOUTH AUSTRALIA RAILWAYS

Total: £A 2,605,000*

Locomotives	£A 712,000
Passenger cars	£A 947,000
Freight cars	£A 71,000
New line construction	£A 250,000
Major track improvements	£A 260,000
Signalling	£A 140,000
Yards and terminals	£A 32,000
Shops and repair facilities	£A 150,000
Housing	£A 43,000

*£A 100 = **$ 225** US
Figures are for current fiscal year (Ends 30 June 1961)

TUNISIAN NATIONAL RAILWAYS

Total: Dinars 714,000*

Railcars and trailers	D 480,000
Shops and repair facilities	D 35,000
Structures	D 16,000
Air brakes (freight cars)	D 15,000
Rolling stock improvement	D 48,000
Renovation of road equipment	D 20,000

*D 100 = **$ 240.40** US

VIET NAM RAILWAY SYSTEM

Total: VN 68,200,000 Piastres* plus US $9,700,000

Locomotives	US	$4,200,000
Freight and passenger cars	US	$4,500,000
New line construction	VN	35,000,000
Major track improvements	VN	25,500,000
Shops and repair facilities	US	$1,000,000
	VN	7,700,000

*VN 100 Piastres = **$ 2.87** US

Current Railway Reading

World Railways 1960, edited and compiled by Henry Sampson; Sampson Low's "World Railways" Ltd., price £5.5.0.—With the subtitle "A Worldwide Survey of Railway Operation and Equipment", this sixth edition of World Railways is just that, and a very fine job, too. In this volume the format of the 1958–59 edition has been closely followed. Leading off the editorial section is a section titled "Tabulated data of the railways of the world in 1959;" as with previous editions of the work, the tabulated listings provide detailed statistics on public railways in every country: name, headquarters, mileage (with a separate tabulation for electrified mileage and generally separate listings of mileage for railways having more than one gauge); rolling stock, with breakdown by different types of motive power and different types of railcars, freight and passenger cars; freight and passenger traffic statistics; and generally extensive information on physical plant and standards, including such items as maximum curvature and gradient, rail weights, axle loadings, and so forth. Particularly useful is the inclusion of metric figures, though "English" measurements are given in deference to what is presumably a primarily English-oriented audiance.

Expanded information on the major railway systems has been given a new and useful look by the inclusion of sketch maps of the systems in nearly every case. As with previous editions, considerable information is given on each line's affairs since last reported, with in most cases a generous selection of recent equipment photos. Instead of being given a separate section of their own as in the fifth edition, each country's principal rolling stock manufacturers have been given a place following the expanded treatment of that nation's railway systems. Underground railway systems again have their own section, and the volume has been expanded with a section devoted to the manufacturers of diesel engines for railway traction.

There is little one can add, aside from remarking that *World Railways* continues to improve its standing as the standard one-volume reference work on the subject, absolutely essential to any railway reference library. One might wish, for instance, for a listing of the more important industrial railway systems in the world (several of which outrank many of the public railways shown in the tabulated data both in size and tonnage) and it is also possible to complain that the line between railways and tramways is sometimes very finely (and not always too consistently) drawn. Perhaps more important, the ultimate usefulness of the work might be improved by a listing of important railway suppliers outside the rolling stock and prime mover fields—trackwork, electrical components and the like. With these few and rather niggling reservations, *World Railways 1960* is unhesitatingly recommended.

Fiddletown and Copperopolis by Carl Fallberg (Hungerford Press, Reseda, Calif., USA)—Over a period of some five years readers of the American *Railroad Magazine* were treated to a monthly account of the life and incredible times of a narrow-gauge railway somewhere (Mr. Fallberg wisely refuses to take a stand on the exact location) in the American West. Now John Hungerford has collected Mr. Fallberg's drawings for posterity, preserving in the process a unique phase of US railway history which never happened, but should have. The eccentricities of railway officials, motive-power designers, engineers, operating personnel, local citizens, railway enthusiasts and bears are lovingly chronicled. Many of the topical references to US railway affairs of the early '50s may be obscure to non-US readers, but the general standard of railwaymanship will be instantly recognized in Tehran, Taiwan, or Tasmania. Rowland Emmett's Far Tottering and Oyster Creek Railway has found a fitting companion in the World Railway Pantheon.

Rotterdam's Railways Work to

Antwerp, London and New York, as any citizen of Rotterdam will cheerfully admit, may be great cities with fine ports. But Rotterdam is different. Rotterdam is a great port—with a fine city.

Located at the mouth of the River Rhine, Rotterdam is the world's second-busiest port; every day of the year, on the average, 160,000 tons of seaborne cargo is loaded or unloaded at Rotterdam's quays—58 million tons annually. And even though its location at the natural entry to Europe's inland-waterway system means that much of this cargo moves by barge, the railway plays a vital role in the prosperity and growth of the port.

Port officials and business men know how vital good rail service is to Rotterdam's work, and the Netherlands Railways (NS) has full partnership standing in the city's waterborne economy.

The railway network of Rotterdam—like the city itself—is split into two parts by the River Maas, with only a single rail crossing. Both Rotterdam North and Rotterdam South have main classification yards. North yard is a modern installation, with a hump 5 meters in height, equipped with automatic weighbridge, hydraulic car retarders, and hump switches which can be preset on a code panel in the control tower.

The nerve center of NS operations in the port area, however, is Rotterdam South, a widely-dispersed area centered on the IJsselmonde classification yard.

Through IJsselmonde are routed trains to and from Belgium, France and Spain (via Roosendaal to the south) and Germany, Austria, Scandinavia, Switzerland and Italy (via Venlo and Oldenzaal to the east), as well as traffic to and from Netherlands destinations.

IJsselmonde itself is divided into two yards for northbound and southbound traffic. Both yards—the southbound A yard and northbound B yard—have humps with remotely-controlled turnouts,

Serve a Prosperous Economy

6 reception tracks and 12 classification sidings. Braking of the cuts of cars is by means of manually-placed "skates". During an average night, between 18:00 and 6:00, 1500 cars of incoming and outbound freight pass through the two yards.

From IJsselmonde tracks reach out to four subsidiary yards—Fijenoord, Waalhaven, Handelsterrein Oost and Pernis.

Fijenoord yard, with six reception-departure tracks and 20 storage and sorting sidings, serves the Rijnhaven and Maashaven, two of Rotterdam's most important harbor areas.

Near the Waalhaven—the largest excavated harbor in the world—is the eight-track Waalhaven yard, serving the basin of the same name and the Eemhaven; the Spoorweghaven, Binnenhaven, Entrepôthaven, Nassauhaven and Persoonshaven trackage makes up Handelsterrein Oost, an extensive area of waterside and warehouse sidings.

Pernis—located to the west of the main port area along the New Waterway, Rotterdam's artificial channel to the sea opened in the 1870s—is the petroleum-industry center of Rotterdam, with refineries of Esso, Caltex, and Sheli.

Pernis yard serves the refineries, as well as industries recently established around the Botlek harbor, opened in 1957 and not yet fully developed. While much of the refineries' 23-million-ton output leaves Pernis through the Rotterdam-Rhine pipeline, the growth of petrochemical plants near the refineries has trebled the rail shipment of chemical products in eight years, while rail shipments of crude oil and petroleum products have increased nearly eightfold in the same period. Dutch crude oil from fields near The Hague and Schoonebeek arrive at Pernis yard in daily solid trains of tankcars which bypass IJsselmonde without being classified.

To meet the growth of traffic, the line from IJsselmonde to Pernis has been double-tracked, automatic block signaling installed, and tracks extended to the Botlek area; major realignment of parts of this line, and the building of a new ten-track yard at Waalhaven South, will help meet the area's continuing growth.

Freight traffic is not the railways' only contribution to Rotterdam. Each day an average of over 31,000 passengers arrive in Rotterdam by train, and an equal

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Chemins de fer de Rotterdam

L'économie de Rotterdam, le second port le plus animé du monde et le port de mer naturel du bassin du Rhin, est étroitement liée à l'eau—à la mer et aux rivières européennes. Mais la prospérité de cette économie basée sur le transport par eau exige un bon service de réseau ferré. Les chemins de fer jouent un rôle primordial dans la vie commerciale de la ville. L'utilisation efficiente et imaginative des installations, l'élaboration minutieuse des projets, ainsi qu'un outillage moderne, maintenant un trafic régulier des marchandises du et au port et ses industries et permettent un service fréquent à un horaire serré de transport de voyageurs, tant abonnés qu'internationaux. Dans la ville même, la première ligne souterraine néerlandaise actuellement en voie de construction assumera une part importante dans le domaine du transport en grande masse. Rotterdam grandit encore, tant en importance qu'en superficie, poussant ses avantages de port vers la mer et attirant de nouvelles industries à ses faubourgs. Le rail contribue à cette croissance et en profite.

Eisenbahnen des Rotterdams

Die Wirtschaft Rotterdams, des zweitgrössten Hafens der Welt und der natürliche Seehafen des Rheinbeckens, ist eng mit dem Wasser verknüpft—mit dem Meer und mit den Flüssen Europas. Aber die wassergeborene Wirtschaft ist abhängig von guten Eisenbahnverbindungen; Eisenbahnen spielen eine lebenswichtige Rolle in dem Handelsleben dieser Stadt. Erschöpfende Ausnutzung technische Anlagen, sorgfältige Planung und moderne Ausrüstung, sichern den Strom der Waren in und aus dem Hafen und seiner Industrien; frequenter Personenverkehr dient den in- und ausländischen Reisenden. Innerhalb der Stadt ist eine Eisenbahn im Bau—in Form der ersten niederländischen Untergrund, die im Massenverkehr eine grosse Rolle spielen wird. Rotterdam nimmt an Wichtigkeit und Umfang zu, bringt seine Hafenanlagen näher ans Meer und seinen Vorstädten neue Industrien. Die Eisenbahn wird die Entwicklung fördern.

Ferrocariles de Rotterdam

La economía de Rotterdam, segundo puerto mundial y puerto marítimo natural de la cuenca del Rin, depende del agua—del mar y de los ríos de Europa. Pero la prosperidad de esta economía depende también de buenos servicios ferroviarios. En la vida comercial de esta ciudad los ferrocarriles juegan importantísimo papel. El uso eficaz e inventivo de las instalaciones, una planificación metódica y equipos modernos permiten un movimiento continuo entre el puerto y las industrias; un servicio de pasajeros intenso sirve a los viajeros locales e internacionales. En la ciudad misma—en forma de la primera línea subterránea de Holanda en construcción—los ferrocarriles jugarán importantísimo papel en transporte colectivo. Así la importancia como los contornos de Rotterdam van aumentándose. Sus dársenas avanzan hasta el mar y nuevas industrias se establecen en los surburbios. Los ferrocarriles fomentarán esta expansión.

Good Planning Keeps Rotterdam Freight Moving

To keep traffic moving in and out of Rotterdam's harbor area, with the added requirements of shipping schedules that must be met, is a big lob; with full employment and a jabor shortage, coupled with rising costs, efficient operation is a must, and efficient operation has required careful planning.

The methods adopted at Rotterdam South are worth careful study, for the system employed is one which depends on careful operations analysis and efficient use of existing resources, rather than on complex and expensive equipment.

The first stage in the operations analysis was careful time-study; for every operation 25 timing observations were made by stopwatch to the nearest fifth of a second and the average calculated. Every operation was analyzed, from the time required to loosen the screw couplings and uncouple (39 seconds) to the making of a switch list (14 seconds).

When shunting times were calculated for IJsselmonde and each of the subsidiary yards, attention turned to the time needed to handle a car or cut of cars from one point in the harbor complex to another. To allow for time spent waiting for cars to be readied by shippers and consignees, traffic and other random delays, measurements were taken over extended periods, and the total time in minutes divided by the number of individual cars handled, resulting in average time per car of two minutes. This, added to the actual place-to-place movement times, determined the necessary time in minutes for any move to be made.

Stage two was the determination of an "average day", in terms of load and composition of trains, transport time and other factors.

Once the working norms were established, the third stage consisted of developing a system of planning that would assure efficient and economical operation not only for the mythical "average day", but on a day-to-day basis. For this purpose a central office was established at the main station building, charged with the planning and execution of each day's work.

Period 1, 22:00 to 2:00—placing empty cars. At 19:00 each evening the central office receives a report of the work to be done, including date and time for placement; name of the loading agency; the port, shed and track where cars are to be spotted; kind of cars and number requested; destination of the load; and the type of cargo to be loaded. From this information a working plan is prepared, movement by movement.

Using a simple linear chart showing movement times between harbor-area points, the planner determines the number of minutes of actual travel time, adds two minutes handling and delay time for each car, and computes the total time required for each movement of each shunting locomotive.

For example, 21 cars from Fijenoord are to be placed on sidings at Maashaven North:

Africa shed, waterside	6 cars
Africa shed, landside	2 cars
Scandinavia shed, waterside	8 cars
Scandinavia shed, landside	1 car
Rotterdam Stevedoring Co.	2 cars
Muller siding	2 cars

The time for the entire operation is computed step by step:

From Fijenoord to the gate of Canada shed	18 min.
Canada shed to Africa shed landside and return	16 min.
Canada to Africa waterside and return	14 min.
Canada to R.S.Co. and return	26 min.
R.S.Co. to Muller and return	10 min.
Time required for spotting, (21 · 2 min.)	42 min.
Return from Canada shed to Fijenoord	18 min.
Total shunting-engine time	144 min.

With the times determined for each operation, utilization of men and motive power can be planned for maximum efficiency during the four-hour period.

Period 2, 2:00 to 10:00—placing arriving cars for unloading. From 14:00 to 22:00, the central office receives telegraphic notification from origin or border stations with information on cars which will arrive during the night: train number; number and reporting mark of each car; and the shed, port and track where the car is to be placed.

From the arrival time of the train and the time analysis of yard operations at IJsselmonde, the planner knows when a car will be humped and ready for shunting, and operations are planned so that all arriving cars will be placed by 10:00, times being determined in the same manner as for empty cars.

Period 3, 14:00 to 22:00—pickup and classification of outbound loads. Operations for this period are determined by the same steps, taking into account the number of cars placed during the morning and the number of cars placed but not yet loaded or unloaded.

As soon as a working plan has been prepared, it is given to the various yardmasters. Yardmasters, in turn, maintain constant touch with engine drivers by mobile radio, with each yard assigned its own frequency and all locomotives equipped to receive all frequencies. From the yard crew's reports, the yardmaster reports regularly to the central office, and information given is written on a worksheet so that central office personnel have a constant visual record of the day's operations and can maintain constant control.

The system required a six-month period of time studies and preparation and uses three men per shift in the central office: it has not only produced better results and greater customer satisfaction, but in the 11 months it has been in use productivity per engine has increased to the degree that the same amount of work can be done with a 20 per cent reduction in the number of locomotives and a reduction in expense of one million guilders.

number depart—an annual total of over 23 million arrivals and departures, of which 17 million pass through Rotterdam Central and the balance through the city's seven other stations. Actual peak daily traffic considerably exceeds the average figure, for a large percentage of the total is workday-only commutation traffic. Rotterdam, like all other important Dutch cities, has a half-hourly base service on all lines—a frequency that has earned the NS the affectionate name "The Big Tram". Wholly electrified on the standard Dutch 1500-volt DC system, passenger service is furnished mostly by multiple-unit trains made up of articulated or semi-permanent sets of from two to five cars, including some "Benelux" trainsets fitted for through operation on the Belgian 3000-volt lines.

Not all passenger traffic is via the NS, however. For service within the city and to nearby surburbs, in addition to the ever-present bicycles and "Bromfietsen", —motorized bikes whose name is derived from the Dutch word "brommen" used to describe the buzzing of insects—Rotterdam has a busy municipal tram and bus system, as well as an extensive and profitable rail, highway and ferry transport system operated by the privately-owned RTM (Rotterdam Tramway Company). Formerly a steam tramline whose narrow-gauge tracks blanketed the islands to the south and west of the city, the RTM's rail lines were severely damaged in the floods of 1953, and today only the lines to the west of Rotterdam remain rail-operated, using diesel locomotives built by the company's own forces.

Presently, however, the biggest transport item in Rotterdam's tremendous inventory of civic pride is the building of Holland's first subway.

The Maas, source of most of Rotterdam's wealth either directly or indirectly, is at the same time the biggest obstacle to the city's growth. Spanned by a single vehicular drawbridge, the river is a severe bottleneck, and the more harbor traffic increases the worse the bottleneck becomes.

There is, it is true, the Maastunnel, built before World War II. But the Maastunnel, with its four vehicular lanes, already handles 64,000 vehicles daily and has reached the strangling-point in peak hours. New tunnels and bridges to route auto traffic around the city are underway, but travel between the city's two parts remains a serious problem; the single drawbridge for trams and automobiles even has a public timetable to assist the residents in planning their movements in the city.

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Central Station sees 17 million passengers annually; electric trains offer frequent service.
La Gare Centrale à 17 millions de voyageurs par an; des trains à haute fréquence.
Der Hauptbahnhof bewältigt jährlich 17 Millionen; Triebwagen sichern frequenten Verkehr.
La Estación Central sirve a 17 millones al año; trenes ofrecen un servicio intenso.

Congestion occasioned by the drawbridge was the principal force behind the planning of the Metro. At first envisioned as simply a tunnel to carry tramlines under the river, the project quickly became, as operating problems were considered, a full-fledged rapid transit proposal. The initial project calls for a five-kilometer line starting from the Central station, proceeding underground and under the river to the southern half of the city, and then running on an elevated concrete structure for the last two kilometers to the southern terminus.

The water by which Rotterdam lives presented both a problem and a solution to the Metro's planners. Beside the problems presented by building an under-river tunnel, an additional problem was the level of ground-water in the downtown area. Like most of Holland, Rotterdam is built on a relatively porous soil, with ground-water level only a few meters —if that much—below the surface.

Faced with the problem of keeping water out during construction, the city engineers quickly reversed the problem and decided to use the water as an integral tool in the subway's construction.

Basic construction of the underground section will be by the familiar "cut-and cover" method. A trench will be excavated and walled with sheet-steel planking; as each section is dug it will be filled with more water rather than pumped dry, so that the static pressure of the water in the trench will not only balance that of the ground-water, but will serve as a structural element instead of bracing to keep the walls of the trench from collapsing.

Rotterdam's maritime heritage is also evident in the construction plans for the tunnel itself—as befits a seafaring city, Rotterdam's subway will literally be built in drydocks.

Prefabricated concrete tunnel sections, 60 meters in length in the city, 90 meters under the river, will be built in three docks—one at the Weena, near the Central Station; one at the Blaak, nearer to the river; and one on the river itself for the tunnel sections to be laid under the Maas. As each tunnel section is completed, it will be fitted with temporary end bulkheads and floated into place with the aid of pontoons. Once placed, the sections will be sunk to final position; rubber gaskets between sections will be sealed by water pressure as water is pumped out from between the two bulkheads, the end bulkheads removed, and the temporary "canal" filled.

The construction method, though ideally suited to the unusual ground-water conditions encountered in Holland, is one which can be used for underground construction in any level area.

The Rotterdam Electric Tramway Company—the municipal organization which will have the task of operating the completed subway (construction is under the direction and control of the city engineer)—is already giving attention to the operating requirements of the line, though construction time and the need to avoid congestion in downtown Rotterdam during the construction period will mean that the line will not be in actual operation until 1965 or '66.

Rolling stock—for which proposals have already been invited—will be of two-unit three-bogie articulated design, without passageways between units. Lightweight construction will be used; cars will have two-motor inboard-bearing motor bogies with cardan-shaft drive and 85-hp motors at the outer ends, an idler bogie under the articulated connection, and will use 750-volt direct current with third-rail collection. Rubber fittings and resilient pads will be extensively used throughout; the need to reduce the noise level on the elevated section may dictate the use of resilient wheels. Cars will seat 74 passengers, with space for 200 standees and an ultimate design capacity of 360 passengers. In the initial stages two or perhaps three articulated units per train will be used, though platforms will be designed for 4-unit trains.

The double-track line will be signalled for close headway with automatic train control, and 2.5-minute headways are anticipated for the early stages of operation.

And what of the future? Rotterdam has made a tradition of growth, and growth will inevitably effect Rotterdam's railways.

The growth of Rotterdam's industry will very likely mean more trains of solid cargo bound for inland points to supply a burgeoning European industrial economy. Growing highway congestion—already a serious problem in Holland—will in all likelihood bring about some form of piggyback handling for freight, perhaps a variation of Flexi-Van more suitable to limited European loading gauges than the rail handling of standard highway semi-trailers.

More efficient design of river push-boats will eliminate some parts of the traditional motorized barge and tow operation on the Rhine system and cut into rail traffic, as will increased use of roll-on, roll-off ferry ships handling semi-trailers in short-distance overseas traffic.

On the other hand, highway congestion will give the railways a chance to regain a greater proportionate share of bulk traffic through the port.

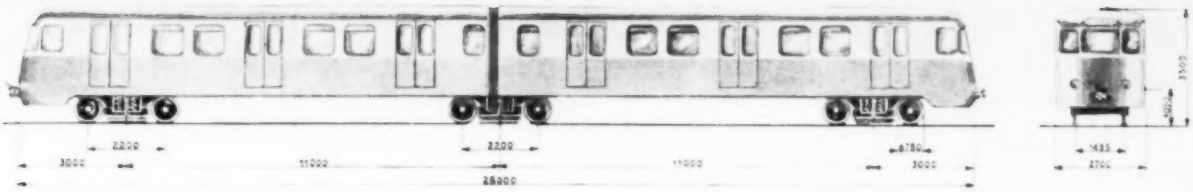
Oil pipelines will cut into railway traffic in crude oil for inland refineries—but more into inland-waterways traffic, which now handles almost all crude-oil shipments moving inland from Rotterdam. An increase in the activities of petrochemical operations now settling in the Rotterdam area, however, may well more than offset any loss in rail shipments of petroleum with traffic in chemicals not suited to pipeline transmissions.

Technically, electronics will surely play a greater rule in railway operations, providing faster service to customers—in the distribution of cars, reporting of shipments, and yard operations. Already under study is a modern electronic hump classification yard serving Rotterdam, based on the design of Margam Yard on the British Railway's Western Region.

Fast international freight trains, such as the planned TEEMs (Trans Europe Express Marchandises, forerunners of which are now operating out of Rotterdam), will provide improved service in European railway traffic.

Not the least of the promises held by the railways' future in Rotterdam is Europoort, the mammoth new harbor now building where the New Waterway and the Maas join the sea.

First planned in 1956 and approved in 1957, Europoort is a project in a hurry. Conceived even before the Botlek scheme was finished, Europoort was expected to unload its first tonnage before the end of 1960. Planned as a harbor for mammoth 100,000-ton vessels—tankers, grain ships and ore carriers—Europoort is a



Cars for metro line will feature modern design, lightweight articulated construction.
Des voitures destinées au Métro, construites selon des conceptions modernes.
Die Untergrundzüge werden modern und von leichtem, gegliederten Bau sein.
Coches modernos para el metro; construcción ligera y articulada.

fitting symbol of Rotterdam's faith in the future. Since its start in 1957, 80 per cent of the 50 million cubic meters of earth-moving planned for the first stage of the harbor has been accomplished.

Designed first of all as a petroleum port, Europoort even in the first stages includes sites for ore docks, bulk cargo facilities, and a steel-mill. Typical of Rotterdam is the fact that a steel company has not yet been found to occupy the steel-mill site. But there is no question in the minds of Europoort's planners—or in the minds of Holland as a whole—that there will be a steelmill there.

Railways have a definite place in the plan for the Europoort; land has already been reserved in the blueprints for railway spurs connecting Europoort's industries and quays with the rest of Europe. Ask the engineers of the harbor board and they will tell you why. "Whatever they may start out with, sooner or later every industry wants rail service."

Rotterdam is famous for justified boasting; asked about the rate of expansion, the city's planners will tell you. "The Channel tunnel is a very impressive proposal; we will be very happy when it is finished. We expect the port of Rotterdam will reach England before it does, and we'll be there to say hello."

If Rotterdam lives up to its reputation, it *will* be there. And Rotterdam's railways will be there with it.

Rail service plays vital role in attracting and serving petrochemical, other industry.
Les avantages du rail attirent et desservent les industries pétrolifères et autres.
Eisenbahnen spielen wichtige Rolle im Rahmen petrochemische und andere Industrien.
El servicio que ofrecen los ferrocarriles atrae a la industria petrolera y otras más.

Canada:

Largest built outside America, crane has 226-metric ton capacity.
La grue la plus large construite ailleurs qu'aux EU a une capacité de 226 tonnes.
Grösster, ausserhalb Amerikas gebauter Kran, 226 Metertonnen-Leistung.
Grúa más grande construida fuera de la América, capacidad 226 toneladas.

Canada's Quebec Cartier Mining Company has taken delivery of the largest railway wrecking crane ever built outside North America. With a lifting capacity of 226 metric tons, the giant diesel-hydraulic crane—for emergency use on the Chemin de Fer Cartier, the iron-ore company's 306-kilometer heavy-duty line between the Lac Jeannine mines and Port Cartier on the St. Lawrence River—is the equal of any built anywhere in the world.

Built by England's Cowans Sheldon, Ltd., the wrecker is designed for service in temperatures as low as 42°C and can negotiate curves of 49 meters minimum radius. Maximum lifting capacity on the main hook is attained at a radius of 5.35 meters with outriggers set, at a lifting speed of 1680 cm/sec.

In addition to the 12-fall main block with its ramshorn-type double hook, the crane has a 4-fall auxiliary block with a 5100-kg maximum capacity and a single-fall whip hook capable of handling 1265-kg loads. Auxiliary and whip hooks are of trapezoidal design.

Power is provided by a Rolls-Royce C6SFL 255-hp supercharged diesel engine driving a Twin-Disc torque converter and epicyclic reverse gearbox. Drive to the crane machinery is through enclosed spiral bevel gears and longitudinal cardan shafts. Separate positive multi-jaw clutches are provided for each of the three hoists, while the jib hoist is driven through bevel, worm and spur gearing. The jib can be derricked in from traveling position to full height in approximately two minutes.

Slewing motion is provided through reversible friction clutches and bevel and spur gearing; the crane can be revolved a full 360° in two minutes under full load. The inner axle of each six-wheel bogie is driven through spur and bevel gearing, drive from the superstructure being transmitted through the main center pin. The crane will travel with a load of 39,000 kg at a speed of 46 meters per minute on a straight 2.5 per cent grade, or at 92 meters per minute on the level. The propulsion drive is disengaged by sliding pinions when the crane is hauled in a train.

Severe winter conditions on the Cartier line have made necessary a number of special provisions for cold-weather operation. The main engine will operate in ambient temperatures down to —42 C and is arranged for satisfactory starting at —23°. The engine cooling system is

Big New Crane for Cartier Line

Grue Cartier

Pour des déblaiements importants des voies la Quebec Cartier Mining Company canadien a acquis la plus grande grue sur wagon jamais construite au dehors des EU. La grue anglaise d'une capacité de 226 tonnes, a un moteur diesel, une transmission hydraulique et est entièrement soudée, et capable de faire face aux conditions sévères de l'hiver canadien, pour le transport des minerais par la ligne Cartier.

Cartier Kran

Für schwere Trümmerräumungsarbeiten liefert die kanadische Quebec Cartier Mining Company die grössten Eisenbahnkräne, die je ausserhalb Nordamerikas gebaut wurden. Der in England gebaute Kran, Gesamtleistung 226 t. hat Dieselantrieb, hydraulische Uebertragung und charakteristische ganzgeschweisste Konstruktion, spezielle Vorrichtungen für strenge Winter auf dem Erzförder Cartier.

Grúa Cartier

Para trabajos de descombre la Quebec Cartier Mining Company del Canadá ha adquirido la grúa más grande construída fuera de la América del Norte. Construída en Inglaterra, esta grúa diesel tiene una capacidad de 226 toneladas. La transmisión es hidráulica y la construcción enteramente soldada. Equipada para funcionar bajo condiciones invernales en la nueva linea Cartier del Canadá.

fitted with an immersion heater operating from external AC mains while the crane is not in use, and a combustion heater is provided in the superstructure for engine warming. Outlets permit heated air to be taken from the unit for defrosting external equipment. The entire superstructure cab is lined with 5-cm Rocksil insulation; most windows are double-glazed for insulation, and a heavy-duty marine-type wiper with de-icing equipment is fitted to the driver's front window.

The crane is of welded construction throughout; the jib is built up from alloy steel plate, while the undercarriage consists of two welded high-tensile steel side girders and end sills, with cross-girders under the roller path and at the bogie pivots. Telescoping outriggers are provided at the ends and center of the frame, and quick-acting rail clips are fitted.

Bogies are of the "Commonwealth" cast steel type, with plain-bearing journal boxes and rolled-steel wheels with multi-wear rims. Axle-loads are equalized, and jack-screws built into each spring group relieve the springs of load while the crane is working.

The crane in travelling position has a height of 4.65 meters and width of 3.2 meters; the undercarriage measures slightly more than 12 meters over end sills, and 12.2 meters over coupler pulling faces. Maximum axle load in running order, with jib suspended and blocks supported on an adjoining car, is 30,650 kg.

The running carriage is fitted with Westinghouse "AC" automatic air brakes for train operation, and with independent straight-air braking controlled from the operator's cab. Clasp brakes operate on all wheels and separate air cylinders are fitted on each bogie. Standard bottom-operated type F interlocking automatic couplers are used, together with friction draft gear.

The crane, and a "little sister" with a capacity of 136 metric tons, now being built and due for delivery in March, are the only major items of equipment for the multi-million-dollar Cartier project to be purchased outside North America.

The railway on which these cranes will operate should be ready to begin regular operation this winter. First planned in 1956, the Cartier will tap iron ore reserves estimated at 300 to 400 million tons; not far to the north, in the Wabush Lake area, the parent Quebec Cartier Mining Company has an estimated 700 million tons of additional reserves.

The Cartier in some respects comes close to being the ideal railway—"One commodity and all downhill."

While some general service freight may be handled, iron ore concentrate in 500 cars of 91 metric-ton capacity will be the main business of the line —an estimated eight million tons annually, with a possible eventual figure reaching 20 million.

In the direction of loaded movement the maximum compensated grade will be 0.4 per cent permitting the operation of 14,500-ton trains behind 1800-hp diesel yard-road units operating in multiples.

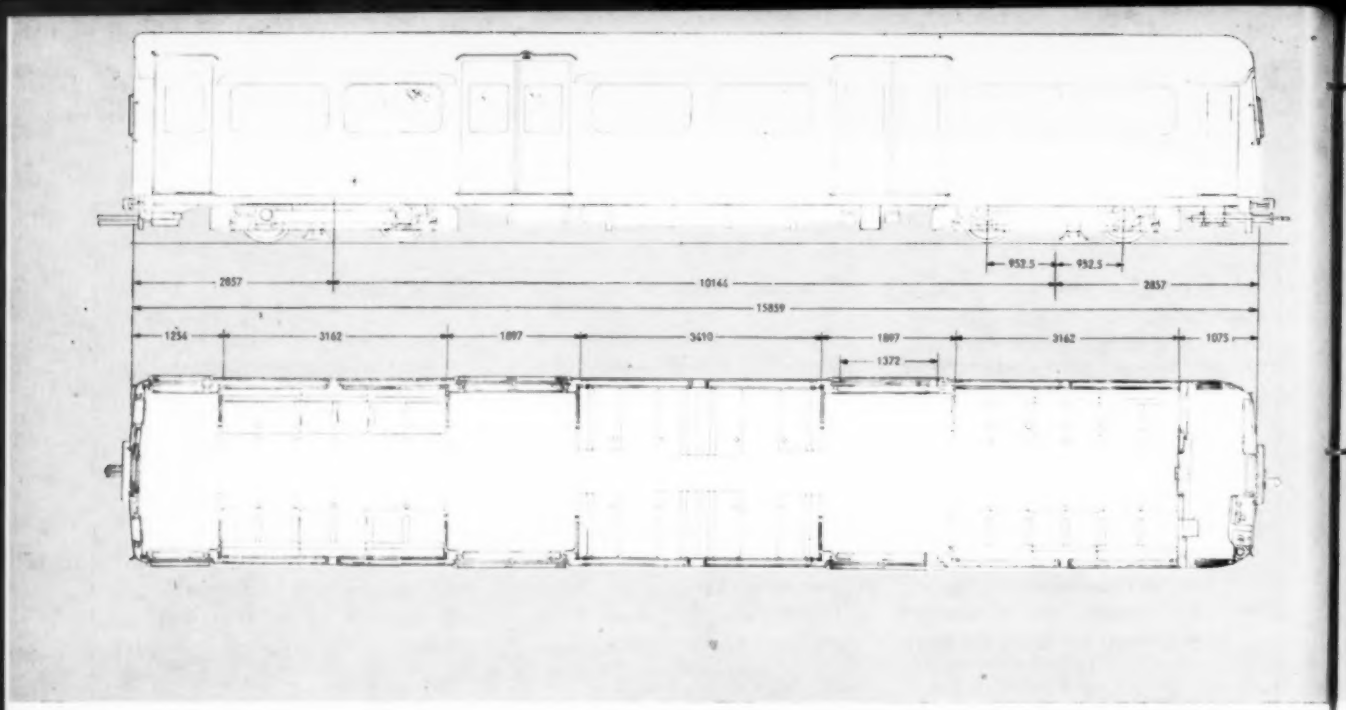
Unloading of the concentrates at Port Cartier will be by rotary dumper; special rotary couplers will permit the dumping of cars without uncoupling. Each dumping cycle lasts 80 seconds, requiring about two hours and forty-five minutes for an entire 160-car train.

The railway, laid with rail of 66 kg/m welded into double lengths of 24 meters, has 17 bridges and five tunnels, and will have a maximum curvature of seven degrees.

Rolling stock, in addition to the 500 ore cars, will include 17 diesel road units built in Canada by General Motors Diesel Ltd. and Montreal Locomotive Works, the two British-built cranes and two others, two wedge-type snowplows and one rotary, and some 165 general service and special freight cars.

The Cartier's builders were able to gain from the experiences of the nearby Quebec, North Shore and Labrador line, a 590-km line owned by the Iron Ore Company of Canada and having roughly similar traffic and operating problems.

The tremendous investment in mining and transport facilities makes constant utilization of physical plant and a steady flow of traffic essential, and provides the reason for the unusually heavy wrecking crane, which must be able to lift loaded cars with a total weight of 108 metric tons, or the heavy diesels, to prevent derailments from tying up the line.



New Prototype Tube Cars Enter S

For tube service on one of the world's busiest underground systems, London Transport Executive has placed in service twelve aluminum-bodied motor cars incorporating many new design features. Operating on the LTE Central Line, the new tube stock will provide information for the design of future equipment.

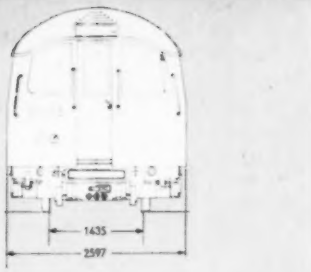
Designed to the requirements of LTE's chief mechanical engineer (railways) and built by Cravens, Ltd., of Sheffield, the motor cars are of a single-end design, with traction motors on all four axles. In Central Line service the new equipment will be used in three eight-car trains; each train will consist of two four-car sets with one of the new motor cars at either end, flanking a pair of trailer cars modernized from 1927 and 1931 tube equipment for service with the new units.

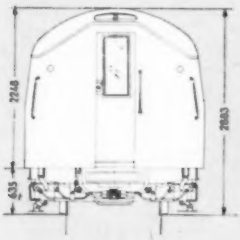
New tube cars seat 40 passengers, have improved fluorescent lighting system.
Les nouvelles voitures du métro de 40 passagers à éclairage fluorescente.
Neue U-Bahn-Wagen mit 40 Sitzplätzen haben verbesserte Tageslichtlampen-Anlage.
Coches de metro para 40 pasajeros, tienen alumbrado fluorescente mejorado.

The 15.8-meter cars have a maximum width of 25.97 meters and a height of 28.83 meters; car sides have a pronounced "tumble home" required by the restricted clearances of the line's 3.56 meter tube diameter.

An important difference between the new cars and previous tube stock is the use of four traction motors on each motor car. The LT. 113 motors are permanently connected in series, and are the first 300-volt traction motors to be employed on LTE lines except in tests. Each motor has a continuous rating of 60 hp at 66% field; motors are of the normal axle-hung; nose-suspended type, with the nose mounted on the bogie between resilient pads. The bogies, designed at LTE's drawing office at Acton, have side frames of welded construction, with rubber bolster and axle box springing. Bogie wheelbase is 1.905 meters, and 787-mm spoked wheels are fitted. Positive collector shoes are of the radial type, supported between axleboxes on a laminated wooden beam; link-type negative shoes used for the LTE's 4-rail system are carried on the bogie frame.

PCM camshaft controls are used, gene-





Service on London Transport

rally similar to those used on previous two-motored stock with contactors and cables of increased rating to handle a current of 312 amperes, compared with the 200-ampere current of earlier cars. Anti-wheelslip equipment is also incorporated in the control system as a precaution.

Where previous LTE equipment used a 600-volt motor-generator set with a 50-volt DC output for auxiliary power supplies, and either a pole-face winding on the generator or a separate alternator for supplying 115-volt 850-cycle AC for fluorescent lighting, the new cars use a 6-kw motor-alternator set with a 220-volt AC output. A stepdown transformer provides 115-volt current for lighting, while 50-volt auxiliary current is taken from a separate winding on the main transformer through a full-wave germanium bridge rectifier. Smoothing chokes are used to protect against AC ripple for battery charging and certain other circuits. A new design

Rames de métro

Les voitures les plus récentes du métro londonien, se composent de 12 voitures prototypes avec carrosserie en aluminium, construites par Cravens Ltd. Ces premières voitures ã 4 moteurs desservent la ligne "Central". Ces nouvelles voitures fourniront des données de grande valeur pour la construction du matériel roulant futur du London Transport Executive. Les voitures seront utilisées dans trois trains composé de huit voitures avec remorques reconstruites d'ancien matériel.

U-Bahn Wagen

Kürzlich lieferte Cravens Ltd. der London Transport Executive U-Bahn, 12 Wagen-Prototypen in Gliederausführung mit Aluminium-Karosserie. Die ersten viermotorigen Wagen sind auf der "Central Line" eingesetzt. Obwohl die Londoner U-Bahn mit vorher bestimmten Wagen ausgestattet werden sollte, können die mit diesen neuen Wagen gemachten Erfahrungen in den Entwürfen für den künftigen Wagenbestand der Londoner U-Bahn verwertet werden.

Coches de metro

Los nuevos coches del sistema subterráneo del London Transport Executive: doce coches de caja de aluminio construidos por Cravens Ltd. Son los primeros coches de cuatro motores del sistema subterráneo del LTE y han sido puestos en servicion en la linea Central. Aunque se ha tomado la decisión de equipar las líneas LTE con coches de modelo previo, esto nuevos coches proporcionarán mucha experiencia para el diseño del equipo futuro.

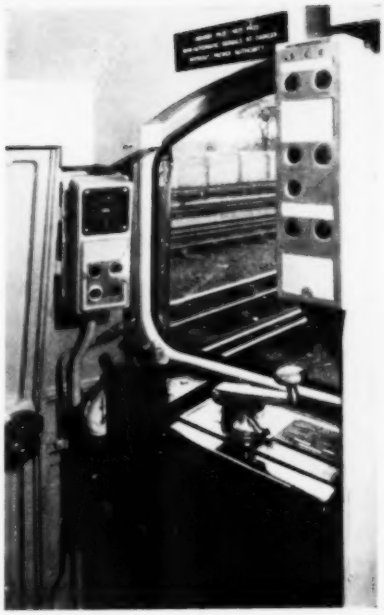
of static voltage regulator with no moving parts is used, rather than the vibrating carbon type formerly employed, which requires considerable maintenance. The entire transformer-rectifier-choke-regulator group has been designed as a single assembly which can be removed or replaced as a unit.

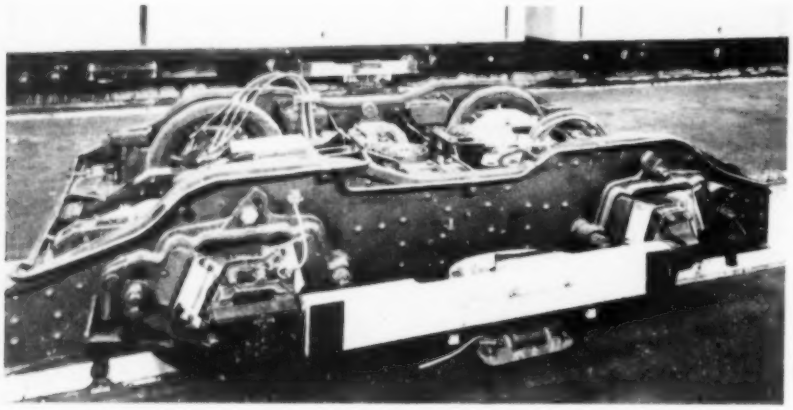
Carbody construction employes a steel underframe in which side sills and continuous crossbearers are the main structural members; center sills are not continuous, being broken at the crossbearers. A steel body frame carries 3.2-mm aluminum side and end sheeting. Aluminum roof panels are used, 14 s.w.g. at the doors and 15 s.w.g. elsewhere.

Each car has four 1.37-meter doorways with double air-operated sliding doors; hinged doors are provided at each side of the driver's cab. Double-width window openings are glazed with 6.35-mm armour plate glass in rubber mountings; interior casement panes, hinged for accessibility, gives the effect of double glazing.

The cars have seating for 40 passengers, arranged in three sections. The two sections between the doors and car ends have two longitudinal seats each seating six; seating in the center section is arranged with four double transverse seats in facing pairs on each side of the aisle. The ceiling is of perforated "peg-board" material for sound absorption, and draft screens at the doorways are set back from the doors to reduce obstruction of the doorways at stations.

Main lighting is provided by 16 40-watt fluorescent tubes, 1.22 meters in length, underrun at 32 watts for longer life, and mounted in two continuous lines of 8 lamps. The tubes have recessed double-contact caps, providing better contact and easier fitting than double-pin tubes.





Motor bogies have welded sideframes and rubber springing, carry 60-hp motors.
Les bogies de moteur avec chassis de bogie latéraux soudés et suspension en caoutchouc.
Triebdrehgestelle mit geschweissten Seitenrahmen, Gummi-Federung und 60 PS Motoren.
Bogies motor tienen bastidores laterales soldados, y muelles de caucho motores de 60 CV.

Trailers for new cars are remodelled older equipment, with new interior and paint.
Remorques pour voitures nouvelles sont des anciennes voitures reconstruites à intérieur.
Anhänger für neue Wagen aus umgebautem älteren Material, neu ausgestattet und gestrichen.
Remolques para coches nuevos de equipo antiguo modernizado con interior renovado.

Another new feature is the use of fluorescent rather than tungsten-filament lamps for emergency lighting. Two of the lamps in each car are fed from the 50-volt DC battery circuit through transistor-inverter units in the event of a power failure. The use of fluorescent tubes provides not only better light, but a reduced current consumption.

Performance characteristics have been matched to those of the existing pre-1938 stock on the line, as with the 1959 tube stock which will be used in the reequipping of the Central Line. A higher speed characteristic is available for future use if desired. Starting current for an eight-car train (four motor cars and four trailers) is approximately 2800 amperes maximum—about 8% less than for a comparable train of pre-1938 equipment.

The 12 trailer cars to be used with the new motor stock were converted from 1927 and 1931 trailers withdrawn from the Piccadilly line; body and frame construction is unaltered, but the cars have been completely renovated, with new cables and wiring and fluorescent lighting. Interiors of the trailers have been completely redecorated as well, and the exterior repainted with aluminium to match the unpainted aluminum-alloy exterior of the motor cars. Riding quality of the trailers was also improved by the application of auxiliary rubber bogie side springs.

Ribbed sides add strength to new cars; kitchen has modern equipment.
Les parois ondulées renforcent les voitures; installation moderne de la cuisine.
Rippenseiten erhöhen Widerstand der neuen Wagen; Küche mit moderner Ausstattung.
Paredes laterales onduladas para la solidez de los coches; cocina tiene equipo moderno.

Sweden: "Flexible" Buffet Car

Voitures-Buffet suédois

Les voitures-buffet suédois sont de construction unique, permettent des utilisations diverses.

Schwedischer Speisewagen

Die einzigartige Bauart Schwedens neuer Speisewagen gestattet vielfältige Verwendung.

Coches-restaurant suecos

Nuevos coches-restaurant suecos permiten el uso para diferentes servicios.

Swedish State Railways' new RBo2 buffet cars feature an unusual "convertible" design that permits their use in a variety of services. A central kitchen, fitted with the most modern equipment for the preparation of meals largely precooked in a central commissary, is flanked by two saloon sections. One section is a permanent 30-seat dining compartment, while the other 22-seat compartment can be variously used as a diner, a cafeteria, or ordinary second-class accommodation.

The kitchen has a service pantry on either side and is arranged for quick service of meals. It is equipped with a large deep-freeze, electric oven, VHF electronic oven, coffee machine, dishwasher, and garbage disposal unit, and kitchen surfaces are almost entirely of stainless steel or melamine plastic.

Four of the new cars were delivered in 1960 and operated on the Stockholm-Göteborg and Stockholm-Sundsvall routes. This winter they are being employed on trains to the North of Sweden to check their operation under severe winter weather conditions. Seven more cars are under construction and due for delivery before the commencement of the 1961 summer schedules. An order for a further 10 cars is under consideration.

Design of the RBo2 was the responsibility of the Traction and Rolling Stock Department of the Swedish State Railways in collaboration with the manufacturers, Kalmar Verkstad AB, and AB Trafikrestauranger. The latter is the Swedish State Railway affiliate responsible for dining car operation throughout the system. Each car cost Swedish kr. 600,000 (US $116,664).

New construction in the rugged Sierra Madre will complete an east-west line linking expanding areas of Mexico's economy.
La nouvelle construction dans la Sierra Madre complétera la connection est-ouest, reliant les régions de voie de développement.
Eine neue Eisenbahnlinie wird eine Ost-West-Verbindung mit den sich ausbreitenden Wirtschaftsgebieten Mexikos vervollständigen.
En la Sierra Madre se construye una nueva linea que une anas regiones en pleno desarrollo.

RAILWAY OF THE MONTH

Mexico: New Rails for Growth

When the construction crews of the Ferrocarril Chihuahua al Pacifico bolt the last rail in place (the time-honored "last spike" has, it seems, been replaced by modern track construction methods) a dream will be realized—a dream with an 88-year history of frustration. Rails across the rugged Sierra Madre range will link the eastern and western parts of northern Mexico, from the Rio Grande to the Pacific port of Topolobampo.

First proposed in 1872, construction of the line actually got under way in 1900, under the ambitious name "Kansas City, Mexico and Orient." As the name implied, the line's promotor, Arthur E. Stilwell, expected the railway to bring trade from the Far East to the heart of the United States, with Topolobampo as the sea-rail transfer point.

Revolution in Mexico brought a halt to the work after 360 km of line in three separate sections had been built—eastward from Topolobampo, south from Minaca to Creel, and eastward from Chihuahua.

During the twenties the road was extended a few kilometers on the Pacific slope, and the line completed from Chihuahua to Ojinaga, but slim revenues and the high cost of construction kept the vital Creel-Hornillos section from completion.

An east-west line across northern Mexico remained an important goal, and in 1940 the Mexican government purchased the line and the connecting La Junta-Chihuahua section of the Noroeste de Mexico, a line reaching north to Juarez on the U.S. boundary.

It was not until 1953, however, that active plans were made to finish the line. Work began in 1954, and with the merger of the KCM & O and the Noroeste in 1955 the grandiose corporate name disappeared, to be replaced by the more realistic "Chihuahua to the Pacific".

First item on the C-P's agenda was reconstruction of the Chihuahua-Creel section and completion of the 255-km gap in the system.

Westward from Creel engineers faced the same obstacle that blocked the previous attempts to finish the railway: rugged mountains. The task was even greater than Stilwell and his successors had imagined.

Where Stilwell saw a need for "ten or fifteen" tunnels, C-P engineers planned no less than 71, with an aggregate length of 13,343 meters. Sixty of the tunnels, totalling 11,452 meters, have been finished, and the others are nearing completion. Even cuts—in an ingenious reversal of usual practice—are becoming tunnels; where cuts are deep and material unstable, false tunnels have been adopted in preference to retaining walls.

Bridges, though not so numerous, were equally important in a terrain scarred by deep canyons and gullies. Many of the 25 bridges required are being built entirely with reinforced concrete; spans consist of three-rib concrete beams with a depressed upper surface to carry stone ballast.

Larger trestles, such as the 498-meter El Fuerte and 234-meter Chinipas bridges, will use reinforced concrete piers with steel spans—seven 33-meter welded steel beams and three structural steel spans, two of 72 meters and one of 90 meters at the 40 meters high El Fuerte; three structural spans totalling 234 meters at Chinipas, 60 meters high.

Of equal importance to the C-P's plans was reconstruction of existing track on both sides of the Sierra Madre; work was begun at the Chihuahua end with conven-

tional bolted construction, and 160 km of such track was completed.

Meanwhile, engineers from the Ministry of Transport and Communications and the Ministry of Public Works were making intensive studies of the most modern track construction methods throughout the world.

After careful study of both the technology and economics involved, the French-developed "double-elastic" fastenings were selected as providing the best construction available at a cost almost the same as bolted track. Altogether, 70 km of track has been laid using resilient pads and spring fastenings. Experience has shown the construction to materially reduce maintenance costs because of the absorption of dynamic effects by the resilient fastenings, and it is planned to use the method for all future new construction.

At the same time studies of welded rail were undertaken, and again a French-developed method, the aluminothermic process, was adopted. The easy transportability of standard 12-meter rail lengths, the simplicity of the process, and the ability of workers to be trained in a short time all entered into the choice. Results have been good, and in the two years since the process was adopted, no failures have occured.

Another important factor in the choice was the method's advantages in welding track already laid. Altogether 160 km of bolted track and 70 km of track with elastic fastenings have been welded; on the bolted track the 45 kg/m rail is welded into 36-meter lengths, while on track with elastic fastenings, on tangents and curves of less than 2 degrees, welded lengths up to 800 meters are used.

In 1958, with technical and engineering assistance from the Société d'Etudes Ferroviaires (STEDEF) of Paris, a 600-meter experimental section was built using concrete sleepers of the SNCF-RS type, together with elastic fastenings and welded rail. Much of the C-P lies in timber-producing country, where wooden sleepers are both economical and easily available, but the excellent results obtained with the concrete sleepers led to their adoption for the more barren Sinaloa section, and a plant for their manufacture was established at Charay; production of the plant will be used in the building of 167 km of line.

While rehabilitation and completion of the Chihuahua-Sinaloa section has assumed major importance for the C-P forces, rehabilitation of the remaining trackage is planned for the future; both the Chihuahua-Ojinaga section and the Juarez line will be modernized in future

CONTINUED

Nouveau chemin de fer au Mexique

L'achèvement d'une ligne de chemin de fer en montagne au nord du Mexique complètera un projet proposé il y a 88 années et qui a exigé 60 années de construction. La nouvelle ligne avec ses 25 ponts et 71 tunnels, fait partie du programme de modernisation et construction réalisé par le FC de Chihuahua al Pacifico, (gouvernemental), entamé en 1954 pour transformer une ligne à longueur réduite en une ligne vitale entre les états grandissants de Chihuahua et de Sinaloa. La ligne achevée sera la première liaison est-ouest entre le nord central du pays et la région importante cotière du Pacifique, en voie de développement économique considérable. Construction de voie la plus moderne dans l'Amérique du Nord, diesélisation complète, du matériel roulant neuf, permettant à la ligne rénovée de faire face à l'accroissement estimé de 70% du trafic, fourni par l'achèvement de la ligne en montagne.

Neue Eisenbahn in Mexiko

Die Fertigstellung einer 255 km langen Bergbahnstrecke in Nordmexiko wird ein vor 88 Jahren geplantes Projekt abschliessen, dessen Bau 60 Jahre gedauert hat. Diese neue Linie mit 25 Brücken und 71 Tunnel und Teil eines von der staatlichen Eisenbahn Chihuahua al Pacifico ausgeführten Bauprogramms, verwandelte 1954 eine vernachlässigte Nebenbahn in eine lebenswichtige Verbindung zwischen des aufblühenden Staaten Chihuahua und Sinaloa. Diese Linie wird die erste Ost-West-Verbindung zwischen dem zentralen Norden des Landes und dem wichtigen Küstengebiet des Pazifik sein, das sich z.Zt. wirtschaftlich enorm entwickelt. Der modernste amerikanische Gleisbau, vollständige Verdieselung und neues Rollmaterial wird dazu beitragen, dass die zu neuem Leben erwachte Strecke die erwartete 70%ige Verkehrssteigung, die die Fertigstellung der Bergbahn mit sich bringen wird, bewältigen kann.

Nuevo Enlace Ferroviario para Mexico

Después de 60 años de construcción un proyecto de hace 88 años será llevado a cabo—255 km. de recorrido en la zona montañosa de la parte norte de México. La nueva línea con sus 25 puentes y 71 túneles forma parte de un programa de modernización y construcción de los FC de Chihuahua al Pacífico. Se inauguró la obra en 1954 y se ha convertido una vía secundaria desatendida en un enlace importantísimo entre los estados de Chihuahua y Sinaloa en pleno desarrollo económico. Será el primer linea del este al oeste uniendo el Norte Central del país y la región importante de la Costa Pacífica, cuya economía está desarrollándose con una rapidez enorme. La construcción más moderna de la vía, dieselización total y nuevo material rodante permitirán la manipulación del aumento del 70% del tráfico.

Modern concrete bridge construction, concrete sleepers on part of new line are typical of modern construction.
Construction moderne des ponts en béton armé, des traverses en béton armé caractérisent la construction moderne.
Moderner Eisenbeton-Brückenbau, Eisenbeton-Schwellen auf Teilen der neuen Linie sind typisch moderner Konstruktion.
Construcción moderna de puentes, durmientes de hormigón en una parte de la nueva vía.

MEXICO CONTINUED

programs. In all cases rehabilitation will include realignment where necessary, enlarging of embankments, new 45-kg/m rail and elastic fastenings on wood sleepers (concrete in some areas), and welding of rail into long lengths wherever alignment permits.

Modernization of rolling stock—especially of motive power—is also an important goal for the C-P, and dieselization is already well advanced. Today the motive-power stud includes 21 diesel electrics—13 Fairbanks-Morse yard-road units of 1600-hp, 1 Alco 1500-hp road unit, 2 yard-road Alcos of 1000-hp, and 5 Alco 900-hp yard shunters. Purchase of 10 additional diesels—9 1600-hp units (3 for passenger and 6 for freight service) and one 1200-hp unit, preferably of the yard-road type—is expected to complete dieselization of the line within the next year, retiring the 12 remaining steam locomotives, 2-8-0s and 4-6-2s ranging in age from 40 to 60 years.

Next in importance is modernization of freight rolling stock. Of the 1448 freight cars now in use, all but 120 are more than 20 years old, and only 40 are of all-steel construction. During the next five years 1300 all-steel cars of 50-ton capacity will be purchased, all made in Mexico.

Completion of the mountain section will provide plenty of work for the new equipment. During 1959 the C-P handled 219 million ton-km of freight traffic on its 1338 km of line; completion of the mountain line is expected to produce an almost immediate increase of 70 per cent.

Traffic on the line at present consists mostly of timber and agricultural products, though the Chihuahua division does carry considerable ore traffic as well. Sugar cane, sugar and vegetables provide the mainstays of Pacific division traffic; aside from the Chihuahua division's ore traffic, freight on the rest of the line is principally timber and cattle. Heaviest traffic at present is on the former Noroeste section comprising the Juarez division, but on its completion the heaviest concentration of traffic will in all likelihood move to the Chihuahua-Sinaloa line.

While the C-P does possess connections with US railways at both Juarez (El Paso) and Ojinaga (Presidio), the lines of the National of Mexico—especially its more direct Juarez-Chihuahua route—will probably continue to carry most international traffic, leaving the C-P primarily with local traffic and the important Chihuahua-Sinaloa freight.

As with most railway lines in Mexico, passenger service is regarded as a social service; the growth of competing motor bus lines has kept the total traffic low, and at present service is almost entirely by mixed train. Passenger traffic in 1950—the most recent year for which statistics are available—totalled 27.3 million passenger-km. The line's management observes, with considerable reserve, that "Purchase of equipment will be made in accordance with any passenger traffic increase noted."

The building and rehabilitation of a railway of the C-P's extent is a major investment for any country; cost of the current program, including both new construction and rehabilitation, is estimated at 1565 million pesos ($125 million US). As an investment in the national wealth, it will not be repaid from the railway's earnings, but from the growth of the areas it serves.

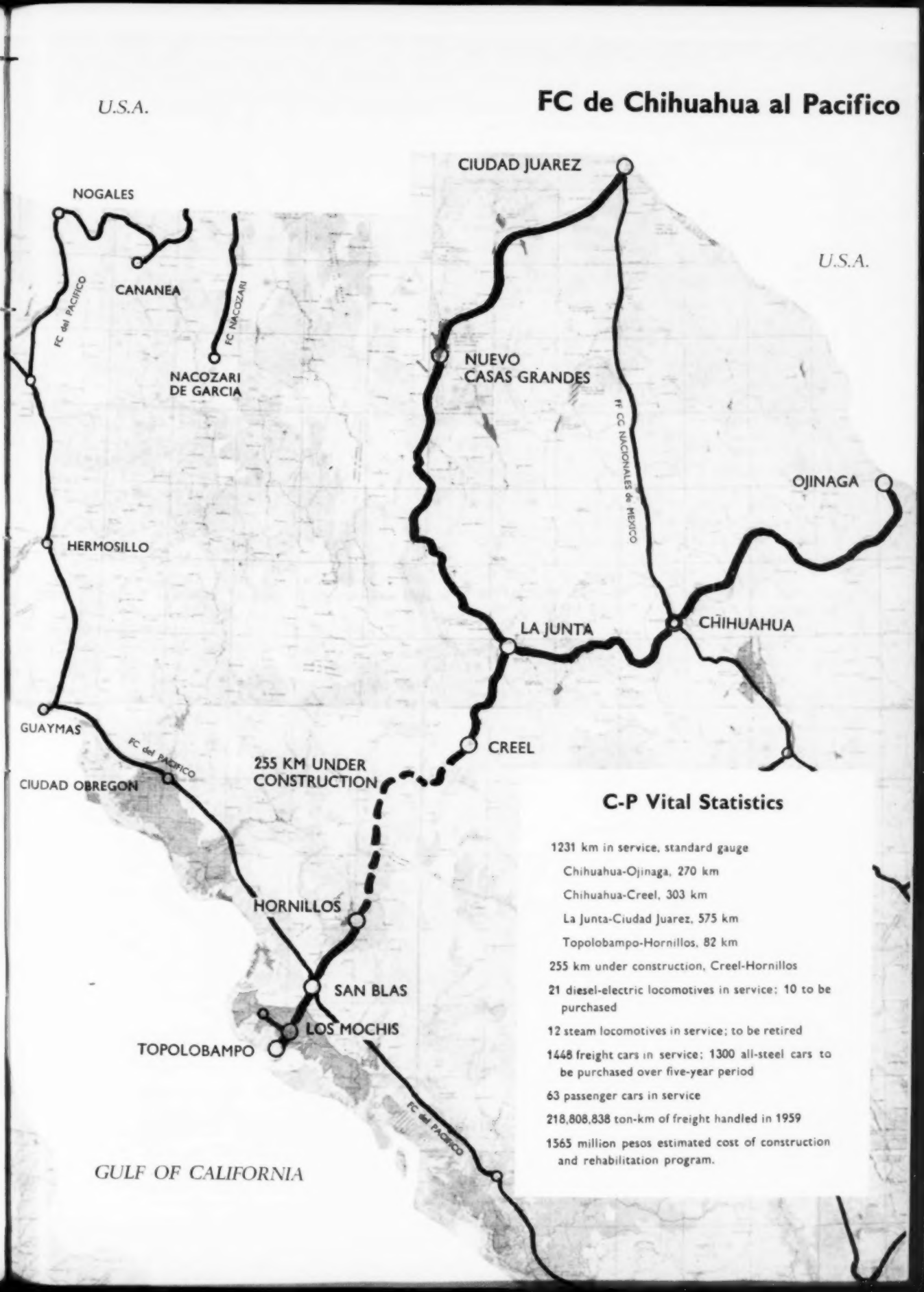
Northern Mexico today is Mexico's "new frontier", an area of tremendous economic growth. Of special importance is the northwestern section comprising the states of Sinaloa, Sonora, and Baja California, and the development of these areas has spurred vigorous construction and rehabilitation of the railways serving the area. When the government took over the former Southern Pacific of Mexico from its private owners, an almost complete face-lifting resulted; the renamed Ferrocarril del Pacifico was rebuilt from end to end, partly with help from the International Bank for Reconstruction and Development. Earlier the Sonora-Baja California line, providing an all-Mexican link between the Pacifico and the agricultural area along the California-Mexico border, was completed.

The Chihuahua line will provide the final rail link-up needed to assure the area's prosperity. It will also help immeasurably in the growth of the state of Chihuahua, providing a Pacific Ocean outlet for Chihuahua's growing production of cotton and other agricultural products.

The growth of agriculture, as more and more land is placed under irrigation, will bring with it a growth in manufactured goods and other traffic such as chemicals needed for the production of fertilizer. The expansion of commercial fishing in the Gulf of California will doubtless make a contribution to traffic as well.

Financing has already been secured to begin the dredging of a deep-water port at Topolobampo, and with the completion of the line the dreams of the road's original promotors will have been largely realized.

But instead of being a short-cut for US commerce, the line will be Mexico's own, serving Mexico's own expanding economy.


FC de Chihuahua al Pacifico
U.S.A.
U.S.A.
CIUDAD JUAREZ
NOGALES
CANANEA
FC del PACIFICO
FC NACOZARI
NACOZARI DE GARCIA
NUEVO CASAS GRANDES
FF CC NACIONALES de MEXICO
OJINAGA
HERMOSILLO
LA JUNTA
CHIHUAHUA
GUAYMAS
FC del PACIFICO
CREEL
255 KM UNDER CONSTRUCTION
CIUDAD OBREGON
HORNILLOS
SAN BLAS
LOS MOCHIS
TOPOLOBAMPO
FC del PACIFICO
GULF OF CALIFORNIA
C-P Vital Statistics
1231 km in service, standard gauge
Chihuahua-Ojinaga, 270 km
Chihuahua-Creel, 303 km
La Junta-Ciudad Juarez, 575 km
Topolobampo-Hornillos, 82 km
255 km under construction, Creel-Hornillos
21 diesel-electric locomotives in service; 10 to be purchased
12 steam locomotives in service; to be retired
1448 freight cars in service; 1300 all-steel cars to be purchased over five-year period
63 passenger cars in service
218,808,838 ton-km of freight handled in 1959
1565 million pesos estimated cost of construction and rehabilitation program.

"English is used too." Considerable problem in parts inventory and operations: "The common difficulty appears when we have to take some measures in a standard, in the English for instance, and the only tool on hand that fits the job is in the metric system, or vice-versa." Metric standardization suggested.

• **Peruvian State Railways:** "All standards" in use with none predominating but "We would prefer to stick to one standard—metric." With regard to a question about specific examples of difficulties, this terse reply: "Too long to enumerate."

• **South African Railways and Harbours:** English measurements and Whitworth threads standard, other standards in use but to a limited degree; specify standards carefully when ordering, but machinery calibrated in metric system rather than inch units presents a problem. "Consideration is being given to more extensive use of Unified thread systems."

• **Syrian Railways:** Metric measurements and screw threads standard and "We always insist on getting metric systems where possible." As a result few non-metric parts are in use and the problem is regarded as minimal, but metric system standardization is recommended.

• **Tunisian National Railways:** Metric throughout, and "We think the best way to avoid any trouble of this kind is to keep but one standard."

• **Turkish State Railways:** Metric measurements and threads standard, but different standards in use, with Whitworth threads predominating. No effect on choice of supplier, but with regard to inventories and maintenance: "Very hard to keep up with the demand. Usually we manufacture screws, bolts, nuts, drills, taps and dies whenever needed. This delays the repair and maintenance". Universal adoption of the metric system recommended.

• **Viet Nam Railway:** Uses metric measure and threads exclusively; single set of standards does influence choice of suppliers to some degree, has avoided any problems.

Statistically, a tabular breakdown shows the following results:

Railways Replying	13
Measurement standards	
Metric only	6
English only	4
Both	3
Thread standards	
Metric	4
BSW and other Whitworth	6
Metric and BSW	2
Metric, Whitworth, American	1
Measurements used in practice	
Metric only	3
English only	2
Both	8
Threads used in practice	
Metric only	3
BSW only	1
Metric and BSW	2
American and BSW	1
BSW and Unified	1
Metric, BSW and American	5
Roads reporting a definite problem	10
Influences source of supply	5
Special provisions to avoid problem	3
Recommended solution	9
Metric system and standards	7
English and BSW	1
Single standard, unspecified	1

In addition to the formal survey of purchasing officers, IRJ also talked to a number of railwaymen and asked them for their frank comments on the problem.

One US railway officer, whose railway experimented with a locomotive incorporating German-built power components, attributed much of the maintenance difficulty experienced to the standards problem, especially with regard to screw threads. The problem, he felt, was magnified by the presence of only a single unit of a varying standard on a system otherwise using US standards—a problem mentioned by other railwaymen.

A French engineer, who had served as chief of a motive-power depot including US-built diesel units, experienced the same problem in reverse. Not only screw thread problems arose, he observed, but routine maintenance was hampered by the necessity of working to inch measurements with machinery set up for the metric system: "We finally had to go out and buy tools just for those locomotives".

It is significant that most of the railways reporting problems of a more or less serious degree are those in nations either recently independent or formerly closely tied to the industry of a particular manufacturing nation. Many of these nations, embarking on large-scale railway modernization programs and having limited foreign-exchange resources, must shop carefully for equipment. To benefit from maximum world-wide competition on the part of suppliers with varyings standards, these railways must perforce accept a diversity of systems.

The alternative—and one adhered to by some lines—is to insist on standardization, but with major producing nations divided on standards—US and Canadian manufacturers use inches and American Standard threads; British firms use the English system and Whitworth threads to a large degree, though Unified threads are gaining acceptance; Continental manufacturers use the metric system, and metric thread standards, spurred by their adoption by the European railway organizations, are replacing the Whitworth threads formerly used by many Continental builders—rigid insistence on standardization limits potential sources of supply.

While the problem is severe for the railways themselves, the question of standards presents problems to the manufacturers as well. In February IRJ's "World Poll" will analyze some of the replies received from the supply industry.

10 reasons why GENERAL MOTORS LOCOMOTIVES are the most sensible investment on Railways

1. Built
by the manufacturer with the world's largest experience in designing, building and servicing Diesel motive power—more than 24,000 units now at work on six continents.

2. Greater dependability
less maintenance, higher availability for service—means fewer locomotives required, lower capital investment.

3. Lowest operating costs
in the industry—maintenance costs have been one-half, even one-third, those of competitive locomotives—a factor even more important than initial cost.

4. Complete range—
270 to 1950 H.P.—with interchangeable parts. Railways can standardize with General Motors locomotives for all services, mainline and branches. One basic inventory of spares fits all units.

5. Service aids,
assistance on maintenance, facilities planning and parts publications by men with the widest background of experience in Diesel applications.

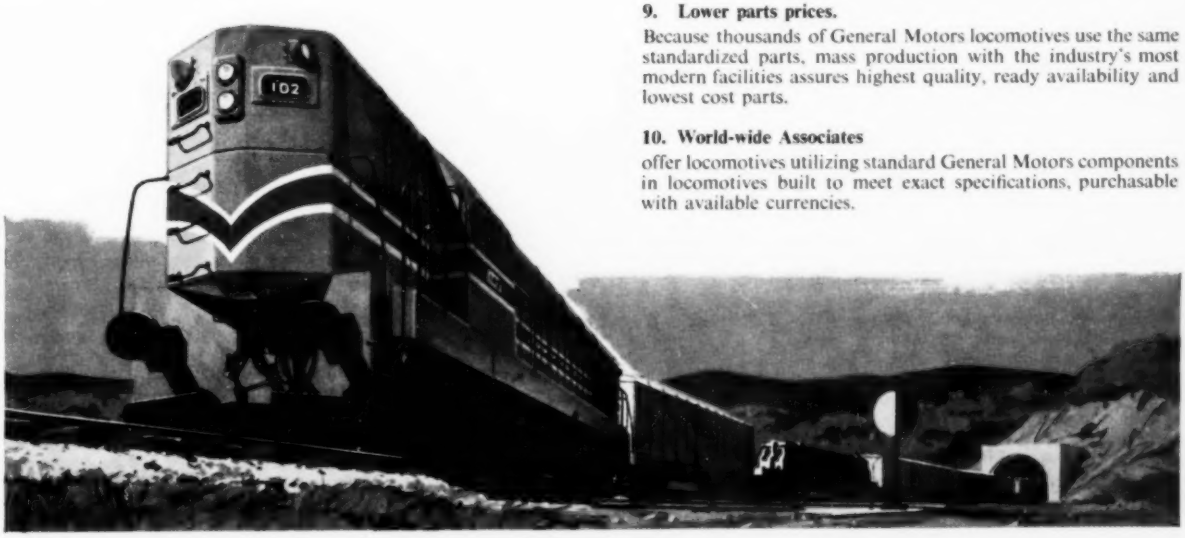
6. Continuous research
to make the best locomotives better. Special engineering of new and improved parts to make them applicable to General Motors units of any age. General Motors locomotives literally improve with age.

7. Unified responsibility
all engines, generators, traction motors and control apparatus built by General Motors—**one** manufacturer, no divided responsibility.

8. Training on the job
and at the Locomotive Training Centre covers service, maintenance and driver training on the locomotive as a unit, not as disconnected parts.

9. Lower parts prices.
Because thousands of General Motors locomotives use the same standardized parts, mass production with the industry's most modern facilities assures highest quality, ready availability and lowest cost parts.

10. World-wide Associates
offer locomotives utilizing standard General Motors components in locomotives built to meet exact specifications, purchasable with available currencies.



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LOCOMOTIVE PLANTS: Electro-Motive Division of General Motors, La Grange, Illinois, U. S. A. General Motors Diesel Limited, London, Ontario, Canada

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GM DIESEL POWER

GENERAL MOTORS LOCOMOTIVES

World's Highest Standard – 270 to 1950 H.P.

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spot tamper is fast and efficient for raising low spots in track

RESUMEN

Con la apisonadora localizada Fairmont W99 Serie B, sólo se necesitan tres hombres para elevar de 25 a 30 puntos bajos en las juntas de un riel durante una hora normal de trabajo. La W99 tiene cuatro pistolas neumáticas que se mueven lateralmente a ambos lados del riel para apisonar firme y uniformemente el lecho del durmiente. Un ariete hidráulico fuerza las herramientas apisonadoras en el balasto duro, y otros arietes se combinan con la vibración de las pistolas neumáticas para compactar el balasto rápidamente debajo de los durmientes. La W99 es verdaderamente fácil de usar gracias a la plataforma giratoria portátil. Puede obtenerse para anchos de vía desde 1 metro hasta 1.676 metros. Una máquina insuperable.

RÉSUMÉ

Trois hommes et une bourreuse Fairmont W-99 Série B peuvent bourrer 25 à 30 endroits aux joints d'un rail en une heure de travail normal. Quatre fusils à air montés sur la W-99 se déplacent latéralement sur les deux côtés du rail, au-dessus de la surface à bourrer, et bourrent rapidement une assiette ferme et uniforme sous les traverses. Un mouton hydraulique force les outils de bourrage dans le ballast dur. D'autres moutons en combinaison avec les coups vibrants des fusils à air pressent le ballast rapidement et fermement en-dessous des traverses. Une base tournante portable et une portée commode rendent la W-99 rapide et facile à manipuler. Livrable pour tous les écartements de voies de 39 3/8" à 66" (de 1 mètre à 1,676 mètre). Les nombreuses W-99 en service ont prouvé leur valeur.

RESUMEE

Jetzt können drei Mann und eine Fairmont W-99 Serie B Gleisstopfmaschine 25 bis 30 Stellen an den Stössen einer Schiene in einer normaler Arbeitsstunde auffüllen! Vier Pressluftgewehre auf der W-99 bewegen sich seitwärts über die Stopfflächen an beiden Seiten der Schiene und füllen eine dichte und gleichmässige Schwellenlagerung. Ein hydraulischer Hammer drückt die Stopfwerkzeuge in die harte Bettung ein. Weitere Hammer bewirken in Zusammenarbeit mit den vibrierenden Stössen der Pressluftgewehre, dass die Bettung schnell und dicht unter die Schwellen gepresst wird. Mittels einer tragbaren Drehscheibe und eines zweckdienlichen Abstiches ist die W-99 schnell und einfach zu behandeln. Lieferbar für alle Spurweiten von 39 3/8" bis 66" (1 Meter bis 1,676 Meter). Die vielen sich im Gebrauch befindlichen W-99 Maschinen haben sich überall bewährt.

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Manufacturers of inspection, section and gang cars • hy-rail cars • motor car engines • push cars and trailers • wheels • axles and bearings • ballast maintenance cars • derrick cars • oil spray cars • grouting outfits • tie renewal equipment • rail renewal equipment • weed control equipment.

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Fabricants de voitures d'inspection, de section et d'équipes – Wagons hy-rail – Moteurs pour wagons à moteur – Lorries et Remorques – Roues – Essieux et Coussinets – Wagons à Ballast – Wagons Grues – Wagons à Jet d'Huile – Appareils d'Injection – Matériel de Renouvellement de Traverses – Matériel de Renouvellement de Rails – Désherbeuses.

Hersteller von Inspektions-, Sektoren und Mannschaftswagen – Hy-rail Wagen – Motoren für Motorwagen – Spurwagen und Anhänger – Räder – Achsen und Lager – Bettungunterhaltungswagen – Kranwagen – Ölspritzwagen – Einspritzapparate – Schwellenerneuerungsmaterial – Gleiserneuerungsmaterial – Unkrautvertilgungswagen.

Egypt: Millions for Railways

Rehabilitation of existing lines and equipment, along with the addition of new facilities and rolling stock, is the major program now underway on Egypt's railways. A new five-year program, covering the period 1960–1965, has been projected, extending by three years the initial 10-year program inaugurated in 1952. Highlights of the current work plan, to cost more than 71 million Egyptian pounds (U.S. $205 million), are outlined in an accompanying table.

Accelerated reconstruction of World War II damage and initiation of a broad expansion program on the country's railways followed quickly upon the advent of Egypt as a republic in 1952. The formation with Syria of the United Arab Republic has given additional impetus to the modernization program, as an integral feature of the UAR's overall plan to double the nation's gross national product in ten years and as a major step toward economic development.

The initial 10-year transport modernization plan aimed at complete reorganization of the railway system. This major scheme encompassed track renewals; replacement of rolling stock; improvement of working methods to meet current and future traffic requirements; coordination of railway services with transport by air, water and road; increased gross earnings of the railways and reduced working expenses.

The initial program called for the renewal of over 500 km of existing track, which has been accomplished at the rate of about 70 km per year since 1952. Now, according to reports issued by the UAR Ministry of Communications, the renewal program is to be accelerated to cover 100 km annually, to meet changing conditions in freight and passenger traffic as well as to cover completely the renewals backlog. Large-scale utilization of concrete sleepers is contemplated and a special factory for their mass production has been proposed. A Ministry report notes that the railways consider concrete sleepers to be less expensive and more effective than the steel sleepers used so far.

Railway freight, measured in ton-kilometers, rose more than 30 per cent, and passenger-kilometers over 40 per cent, during the first five years of the rehabilitation program. To handle this expanding traffic volume as well as help recapture traffic diverted to road transport, a changeover from steam to diesel

CONTINUED

Programme ferroviaire Egytien

La rénovation de lignes existantes, la modernization de la force motrice et matériel roulant, des ateliers et installations de triage améliorés, la production locale du matériel augmentée . . . voilà les points essentiels du nouveau programme égyptien pour 1960–'65. Le plan prévoit la rénovation de la voie à la cadance de 100 km par an; l'installation en masse de traverses en béton armé; la livraison de locomotives diesel neuves et des autorails de constructeurs du monde entier; une augmentation de la production dans la première usine égyptienne de wagons à marchandises, tout comme la construction d'une nouvelle usine pour la production de voitures à voyageurs. Le plan fait partie d'un programme de développement à long terme pour l'économie de la République Arabe-Unie; les dépenses totales sont estimées à plus de £Eg.71 millions (US $205 m.).

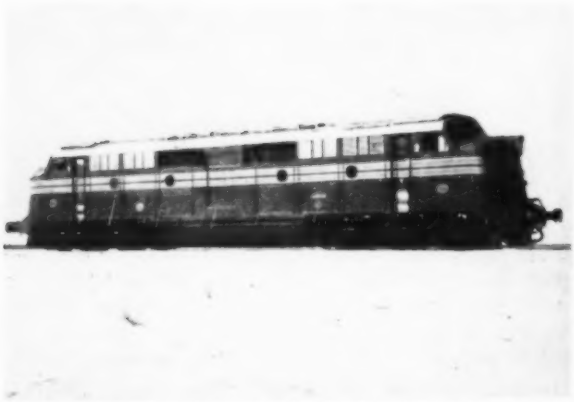
Ägyptischer Eisenbahn-Programm

Rehabilitierung bestehender Strecken, moderne Antriebe und Rollmaterial, verbesserte Werkstätten und Rangier-Anlagen, erhöhte lokale Ausrüstungsfabrikation—sind wesentliche Teile des ägyptischen neuen Eisenbahn-Programms 1960–1965. In diesem Plan ist eine Wiederherstellung von Strecken von 100 km pro Jahr vorgesehen; in grossem Ausmasse finden Eisenbeton Schwellen Verwendung; Fabriken in aller Welt liefern Diesellokomotiven und Triebwagen; erhöhte Produktion bei Ägyptens erster Güterwagen-Fabrik sowie Bau einer neuen Fabrik von Personenwagen. Das Projekt ist ein Teil eines Entwicklungsprogramms auf lange Sicht im Rahmen des Wirtschaftsprogramms der Vereinigten Arabischen Republik. Die Gesamtkosten sind festgesetzt auf mehr als 71 Millionen ägyptische Pfund (US $205 Millionen).

Programa Ferroviaria de Egipto

Rehabilitación de líneas, modernización de la fuerza motriz y del material rodante, adecuación de talleres de mantenimiento, aumento de la producción local de equipo—he aquí el programa ferroviario 1960–1965 de Egipto. Los objetivos son: renovación de 100 km. de vía al año, instalación de durmientes de hormigón en gran escala, adquisición de locomotoras diesel y coches, aumento de la producción de la primera planta egipcia de vagones de cargo, construcción de una planta de coches. El proyecto forma parte de un programa de desarrollo a largo plazo economico de la República Arabe Unida. Se estima el costo en más de 71 millones de libras egipcias (US $205 millones).

Motive-power roster has international origin; 400-hp hydraulic shunter is from Hungary, 950-hp hood unit from USA.
Roulement motrice d'origine internationale; décrocheur hydraulique de 400 CV hongrois; locomotive électrique de 950 CV des Etats-Unis.
Triebfahrzug-Dienstplan hat internationalen Charakter; 400 PS Rangiermaschine aus Ungarn; 950 PS Diesel-Lokomotive aus den USA.
Fuerza motriz de origen internacional: locomotora de maniobra hidráulica de 400 CV de Hungria; unidad de 950 CV de EEUU.



Dual-service 1950-hp unit is one of 108 from Henschel; railcars are some of 350 from Japan's Hitachi.
La 1950 CV à double usage est une des 108 Henschel; quelques autorails des 350 de Hitachi, Japon.
Doppel-Service Einheit, 1950 PS, ist eine der 108 von Henschel; einige der 350 Triebwagen von Hitachi, Japan.
Locomotora es una de 108 unidades Henschel; unos de los 350 automotores de Hitachi, Japon.

Dieselization, Track Renewals Highlight Program

traction is in progress. Contracts for new motive power have been placed among manufacturers in various countries, including 8 220-hp diesel shunters, 38 2000-hp and 70 1400-hp diesel locomotives, ordered from West Germany; 16 2000-hp, 42 1400-hp and 16 950-hp diesel locomotives (USA); 43 400-hp diesel shunters (Hungary), and 350 300-hp diesel railcars (Japan).

Delivery of this equipment will extend over a three-year period which began in 1960. The new locomotives will enable the railways to use diesel traction solely in all shunting operation; passenger service on suburban lines and between main stations on main lines, and all passenger and freight transportation on the Upper Egypt line, will also be dieselized.

Contracts have also been awarded for 240 passenger coaches; 20 three-coach diesel-hydraulic units, for service on the Cairo-Alexandria line; and 2483 assorted freight cars. The latter inlude 246 hopper cars for transport of iron ore from bunkers at Aswan to iron and steel mills at Helwan. A 25-km rail line, linking the ore mines to the main routes and sidings, has been constructed at Aswan. Iron and steel production had its introduction to Egypt's economy in 1955. Some 700,000 tons of ore are now being transported by rail annually. Additional rail transport capacity has also been provided for the movement, annually, of 310,000 tons of coal from Alexandria to Helwan, needed for the iron and steel industry, and 240,000 tons of limestone for the same purpose.

To implement acquisition of new rolling stock and strengthen the nation's industrialization program, the railways have established a partnership with SEMAF, the Egyptian freight car and equipment manufacturing industry. In addition to sharing in the capitalization of manufacturing facilities, the railways have contracted to buy from this national source all freight cars required for their operations. Within the next five years 1868 freight cars—comprising open top

hopper and multipurpose cars—will be delivered to the railway system.

Passenger-car production will also begin in approximately 30 months under terms of a recently-announced contract between SEMAF and Japan's Hitachi Ltd. Under the terms of the agreement Hitachi will supply necessary tools and design facilities, assist in construction of the plant near Cairo, and provide production advice for the first five years of operation. Initial production is to be 75 cars annually.

UAR railways also have established liaison with telephone manufacturers and a special section will be set up to fabricate signalling and telecommunication equipment specifically applicable to railroading. Automatic train control throughout the railway network is contemplated.

A special budget was created for railway operation by the 1956 Reorganization Act. The act also established a "Railway Authority", and a board of directors to manage the railway system. The board establishes general policies and programs, appraises management rules and regulations and approves the annual budget. The railway system is divided into four main divisions: Southern, Central, Northern and East-Delta—each of which is responsible for traffic operations within its regional boundaries. Division managers are directly responsible to the director-general of the railways.

The problem of equalizing competition among rail, water and road facilities and, according to the Ministery of Communications report, "bettering the service for the good of the public", has been delegated to a new General Transport Commission. The task of the Commission is to help coordinate various means of transport and realize smooth operation of the whole transportation system.

The modernization program has created a need for skilled technicians to execute and supervise new projects. The Railway Authority has set up a training program which features:

- A newly-equipped school for apprentices on diesel locomotives and other power units;
- Extension of existing training facilities in the mechanical, electrical, traffic, track maintenance, and signalling and telecommunications departments;
- Expansion of scholarship programs for study abroad;
- Employment of Arab as well as foreign experts in matters closely related to the projects scheme.

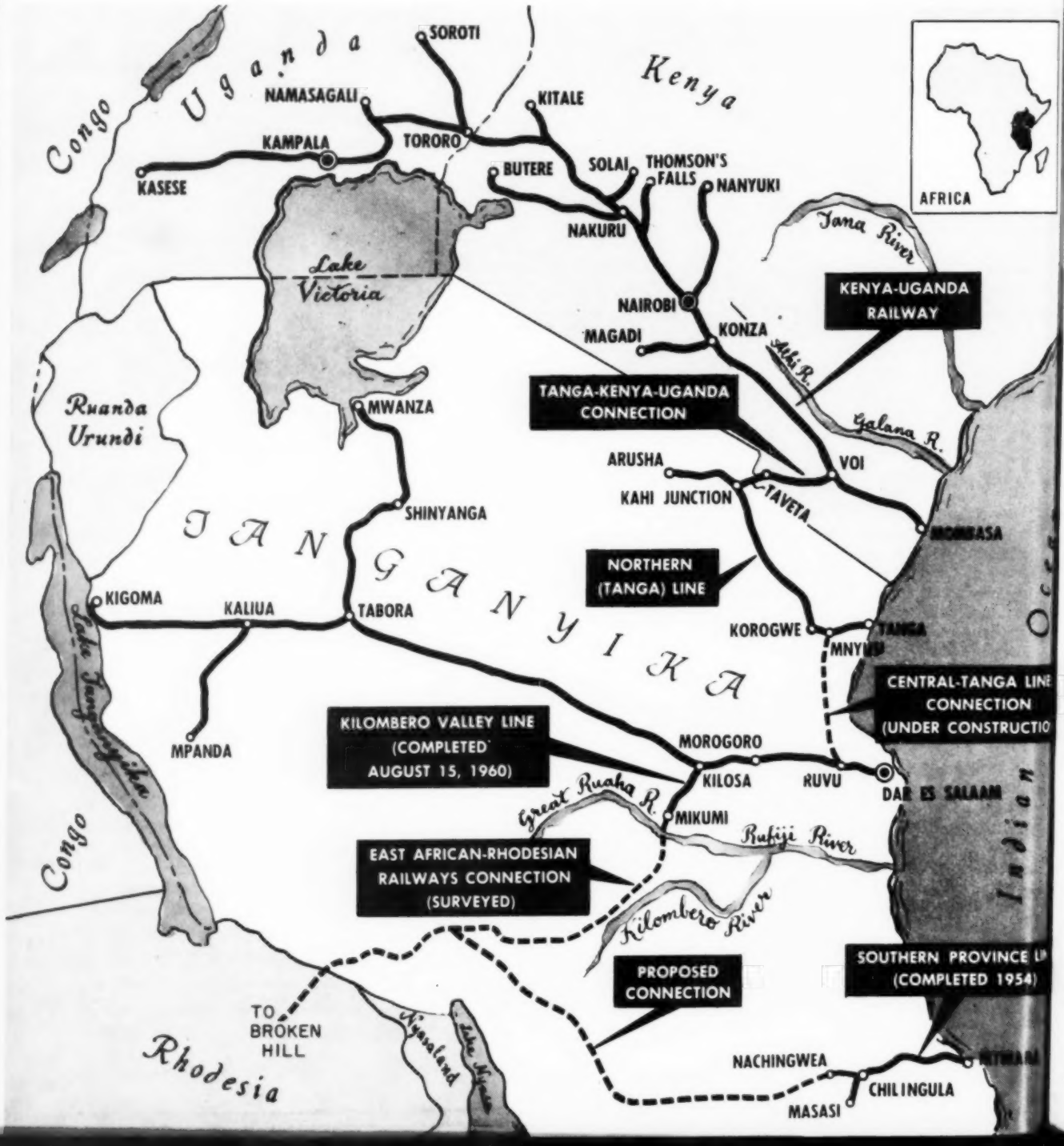
HIGHLIGHTS OF EGYPT'S FIVE-YEAR RAILWAY PLAN

Project	Total Expenditures £ E	US $
RENEWALS:		
New marshalling yard at Qaluib	5,000,000	14,400,000
Strengthening electric current stations at Abu-Zabal and Karbary; renewal of high pressure system at Alexandria	104,000	299,520
Purchase of 100 diesel-electric locomotives	11,000,000	31,680,000
Purchase of 100 diesel-electric units	2,010,000	5,788,800
Purchase of passenger coaches	2,000,000	5,760,000
Purchase of trailers for diesel railcars	250,000	720,000
Renewal of motor trucks used for door to door freight services in Cairo and Alexandria	52,000	149,760
Renewal of freight cars	405,000	1,166,400
Purchase of new cranes for locomotives	520,000	1,497,600
Track renewals	32,000,000	92,160,000
TRAIN SECURITY AND TRAFFIC:		
Automatic train control	2,455,000	7,070,400
Centralized traffic control	2,879,000	8,291,520
Electrification of signals over Cairo-Qaluib line and erection of branch lines' station at Cairo	2,330,000	6,710,400
Improvement of signals of Luxor-Aswan line	1,877,500	5,407,200
Electrification of signals on Kobry-Lemon-Marg line	533,000	1,535,040
Erection of signals workshop	66,000	190,080
Improvement of signals in stations and over the lines	2,080,000	5,990,400
Studies to be carried out for the construction of Southern Region-Sudan railway line	200,000	576,000
Doubling the Qaluib-Barrage line	300,000	864,000
Erection of electric current converter station for Helwan suburban line	100,000	288,000
Reorganization and requipment of stores	275,000	792,000
Spare parts and fuel	2,000,000	5,760,000
Improvement of Farz-Tura line	100,000	288,000
OTHER:		
Erection of workshop for track equipment	300,000	864,000
Erection of new yards	300,000	864,000
Purchase of equipment used in laying tracks and their renewals	450,000	1,296,000
Erection of a new bridge over the Nile at Benha	700,000	2,016,000
Installation of modern equipment at quarries	300,000	864,000
Erection of a new workshop at Boulak	645,000	1,857,600

Tanganyika: New Branch Line C

The Kilombero Valley branch of East Africa Railways and Harbors' Tanganyika Central railway opened to traffic on 15 August 1960, after 18 months of arduous construction. In little more than a fortnight thereafter, work commenced on a line to link the Central and Northern (Tanga) railways of the Tanganyika railways. The two projects are major steps in joining the EAR&H component railways of Uganda, Kenya and Tanganyika into a complete unit, and to form a north-south link between the East African and the Rhodesian railways.

The major north-south project as originally surveyed in 1950–52, proposed joining Broken Hill, a station on the 4,409-km Rhodesia Railways, with Morogoro, the first important station on the Tanganyika Central main line, and thence northeast to Korogwe on the Northern



Completed

(Tanga) line. The Tanga line is linked to the Kenya-Uganda railways by the Kahi-Taveta-Voi branch. The new Kilombero Valley line—71 km—which runs from Kilosa, the Central's second important mainline station (west of Morogoro), south to Mikumi, would form a section of the north-south line to Northern Rhodesia, when and if there is construction of such a line.

Known as the "sugar cane line", the new Kilombero Valley line cost some £715,000 to build. It extends south from Kilosa, across the western end of Tendiga swamp and skirts the Mkegumba mountains over the Mkata plain to Mikumi. Its purpose: to serve the Kilombero Valley sugar project and the Southern Highlands.

The line has advanced the railhead to within some 39 km of the new sugar growing area, and provides direct access to Dar-es-Salaam, important Indian ocean port and capital of Tanganyika. Mikumi, once a comparatively insignificant point on the map, is now an important railhead, with one bulk oil depot already established and the prospect of several new warehouses being built in the planned industrial area. There is one intermediate station on the line, Mbamba, about 41 km from Kilosa.

A major problem in construction was the weather. Two rainy seasons deluge Tanganyika during a typical year: the so-called "long rains", starting in January or February and continuing through March, and the "lesser rains" in October or November. Work progress had to be pushed hard against the first fall of rains. The construction of the Calendar-Hamilton bridge over the Mkondoa river at Kilosa, considered the "magnum opus" of the branch line project, is a case in point: The Mkondoa, only about 30 cm deep during dry season, rises to about 6 meters in the rainy season.

During the dry season it was possible to erect a 40-ton Woodfield pile frame on the river bed. Pier piles ranged from 12 to 27 meters in length. To speed pile driving down to rock bed on a hard bearing, earth was bulldozed out into the river bed 12.2 meters on the east bank and 9.1 meters on the west bank.

A temporary crossing was erected for transport of construction materials and workers to either bank of the river. The finished bridge, consisting of three spans (two of 28.96 m and one of 36.57 m) with two piers and two abutments, cost about

CONTINUED

Nouvelles lignes en Afrique Orientale

Pour rendre accessible les ressources agricoles grandissantes de la vallée Kilombero au Tanganyika et pour réaliser éventuellement la liaison avec le Kénya, l'Uganda et le reste du réseau au Tanganyika ainsi qu'une liaison directe avec les Rhodesia Railways, l'East African Railways & Harbours a récemment achevé une nouvelle ligne de 71 km de Kilosa à Mikumi en 18 mois. "La ligne du sucre" desservira une région sucrière nouvelle avec un débouché direct au port de Dar-se-Salaam, la capitale du Tanganyika et sera le début d'une connection future avec le réseau rhodésien, ainsi que la ligne isolée de la province méridionale de l'EAR&H, achevée en 1954. Quelques semaines après l'achèvement de la ligne, on a commencé à réaliser la liaison du réseau du Tanganyika avec les lignes de l'EAR&H desservant le Kénya et l'Uganda. Cette connection Central-Tanga de 198 km sera terminée probablement avant la seconde moitié de 1962.

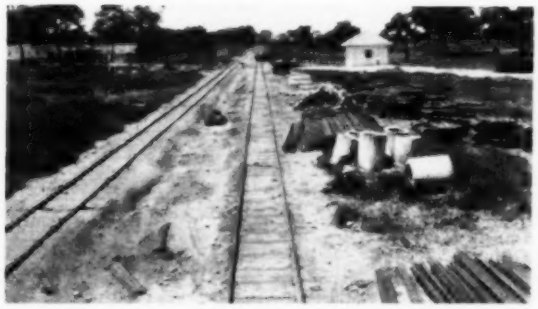
Neue Eisenbahnlinien in Ostafrika

Zur Erschliessung landwirtschaftlicher Quellen des Kilombero Gebietes in Tanganyika und im Rahmen einer eventuellen Verbindung seiner in Kenya, Uganda und Tanganyika liegenden Teile sowie des Anschlusses an die Rhodesia Railways, East Africa Railways and Harbours, wurde kürzlich, nach 18 Monaten, eine neue 71-km Strecke von Kilosa nach Mikumi fertiggestellt. Bekannt als "Zuckerrohr-Bahn", wird die neue Kilombero Valley-Linie einem neuen Zuckerplantagengebiet nützen und unmittelbaren Zugang zum Indischen Ozean Hafen von Dar-es-Salaam, Tanganyikas Hauptstadt, ermöglichen; sie ist als Ausgangspunkt einer künftigen Verbindung mit dem rhodesischen Bahnnetz sowie der EAR&H's eigene, isolierte Southern Province Linie, fertiggestellt 1954, geplant. Einige Wochen nachdem diese Strecke fertig war, begannen die Arbeiten für die Verbindung des Tanganyika-Systems mit den EAR&H-Linien in Kenya und Uganda. Diese Central-Tanga-Verbindung, insgesamt 198 km, soll Mitte 1962 fertig sein.

Nuevas líneas en Africa Oriental

Después de 18 meses de construcción los East Africa Railways & Harbours han llevado a cabo un nuevo ramal de 71 km. entre Kilosa y Mikumi con las finalidades de abrir las regiones agrícolas del Kilombero Valley en Tanganyika y de avanzar hasta las líneas de Kenya, Uganda y Tanganyika y lasde Rhodesia Railways. El nuevo ramal, llamado "ferrocarril azucarero", servirá a una región azucarera conectándola con el puerto de Dar-es-Salaam, la capital de Tanganyika. Será el principio de un enlace futuro con el sistema de Rhodesia y la linea aislada de EAR&H en la Southern Province terminada en 1954. Unas semanas después de la terminación del ramal comenzó la construcción del enlace entre el sistema de Tanganyika y las líneas de los EAR&H en Kenya y Uganda. Se cuenta con la terminación del ramal Central-Tanga, 198 km. en totalidad, a mediados de 1962.

Construction of "Sugar Cane Line" Was Difficult;



Kilosa, at northern end of line, was main materials-storage point; materials were stocked along line during building.
Kilosa, au terminus nord, site du magasinage principal; pendant la construction les matériaux furent stockés le long de la ligne.
Hauptmateriallagerplatz Kilosa, am Nordende der Strecke; Material wurde während des Baus an der Strecke aufgeschlagen.
Kilosa servía de principal almacén de materiales. Durante la construcción los materiales se almacenaban a lo largo de la vía.

Work train crosses temporary bridge during construction; completed steel bridge spans Mkondoa River.
Le train de travaux passe un pont temporaire pendant la construction; le pont en acier achevé enjambe la rivière Mkondoa.
Bauzüge überqueren Notbrücke; fertiggestellte Stahlbrücke überspannt Mkondoa-Fluss.
Tren de trabajos cruza un puente provisorio. Puente de acero sobre el río Mkondoa.

£85,000 to construct. Steelwork for the bridge came from the United Kingdom.

When the rains came, deep mud and water-logged black cotton soil bogged down operations. Construction camps were washed out and major work had to be stopped to dig drains.

It was necessary to place 123 culverts in dried-up river beds to carry the rush of flood waters in the rainy season. The cost of this portion of the project alone was some £60,000.

The prospect of rains also gave urgency to line ballasting. If rains came before ballasting could be done, earth would disintegrate and track become impassable. Ballasting was expedited by the proximity to the project of the Kilosa granite quarry, which produced sufficient material to ballast the line as far as Mbamba, where other suitable gravel quarries helped push the work the remaining 39 km to Mikumi.

But the rains which played such havoc with other construction progress were rather favorably received at the Mbamba bridge project, where thousands of gallons of water was needed to consolidate sand-fill in the coffer dams.

Rainy seasons in the area normally are preceded by high humidity—around 90%—and high temperature. Vegetation in some areas grows thick and fast. Atmospheric conditions were no stimulant to on-the-job performance.

Among the other hazards, elephants trampled around the construction camps at night and rhinos charged vehicles on sight.

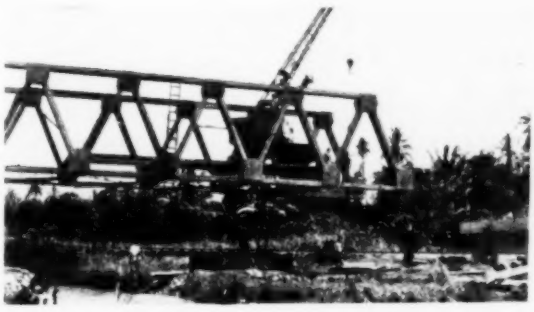
All construction materials for the new line were stored at the resident engineer's yard at Kilosa. However, when major machinery broke down, work was delayed until spare parts could be flown in from Nairobi, Kenya, principal headquarters of the East African railways. Delayed deliveries of steelwork from the United Kingdom also hindered progress, particularly on the Calendar-Hamilton bridge construction.

Work on the line was completed under the direction of L. G. Dormon, successor to Resident Engineer David Allardice, who left the project after its initial 10 months to go on leave.

On completion of the Kiiombero Valley line, work was begun on the Central-Tanga link. Work started 1 September 1960 about 4 km east of Mnyusi station on the existing Tanga line, and is scheduled to finish at a point just over

Branch Will Tap Important New Agricultural Area

Heavy machinery works on Mbamba bridge approaches; construction of steel-sleepered track uses older methods.
Des machines lourdes pour les approches du pont Mbamba; les voies à traverses en acier nécessite des méthodes plus anciennes.
Schwere Maschinerie für den Zusammenbau der Mbamba-Brücke; Stahlschwellengleisbau fordert ältere Methoden.
Maquinaria para la construcción de las cabeceras del puente Mbamba; metodos ma antiguos para la enrieladura.



Bridge span is cantilevered into place. Smaller streams are crossed by culverts; this is largest on system.
La travée du pont est mise en place par cantilever; des rivières plus étroites sont passées par aqueduc.
Brückenbogen wird ausgelegt. Kleinere Flüsse werden durch Rohren geleitet; dies ist die grösste Arbeit.
Se coloca un arco de puente. Alcantarillas para los rios menores; esta es la más grande del sistema.

Authenticated News photos

49 km south. A work force of nearly 1000, to be recruited locally, will be employed in the job, which is concerned principally with construction of culverts and earthwork.

Much of the section is covered by thick forest and traverses somewhat difficult country from Mnyusi over the Pangani river, the ascent out of the Pangani valley and the descent to the coastel plains. Nevertheless, completion of the section is expected within 11 months. Contracter for the work is Sterling-Astaldi (East Africa) Ltd.

Work from the southern end, at Ruvu on the Central line, will start with a contract for the first 16 km. The entire 198-km project is scheduled to be completed by mid-1962.

The EAR&H, headquartered in Nairobi, Kenya, operates the railway, harbor, and scheduled motor services of Kenya, Uganda and Tanganyika, as well as water services on inland lakes and a section of the upper Nile.

The railways—with a route length of more than 5400 km—are largely steam-powered, but diesel traction is handling an increasing share of traffic.

Built to meter gauge, the system has in recent years made new installations with the provision for conversion to the 1.067-meter (42-inch) gauge used in surrounding countries, with special regard for any future connection with the railways of Rhodesia, which would provide through routes to Nyasaland, Mocambique, the Congo, Angola, and South Africa.

Construction of the Central-Tanga connection will provide a most important missing link in the chain of rail communications within East Africa, according to EAR&H General Manager J. R. Farquharson, and will increase to some 5,454 km the single track railways open to traffic within the jurisdiction of the East African Railways & Harbours. This includes Tanganyika's Southern Province line, completed in 1954, which extends from the deep-water port of Mtwara on the Indian ocean to Nachingwea and Masari, inland. A connection for the Southern Province line with the rest of the East African railways system has been proposed at a point on the surveyed North-South rail link between the East African and Rhodesian rail lines. Its construction would join the entire East African railways system in a complete unit.

Railway Conference Reports:

Pan American Congress Drew Over 500 Railwaymen

For sixteen days during October the railways and the government of Brazil were hosts to the Tenth Pan American Railway Congress—160 delegates from other nations throughout the western hemisphere, as well as 345 delegates from Brazil itself and visitors from several European countries. In addition to considering a wide variety of technical papers, the delegates had the opportunity for a close look at the host nation's railway industry, through visits to railway installations and Brazilian railway equipment plants. The conference also included the opening of a major exhibition of railway rolling stock and other equipment.

The X Pan-American Railway Congress, held in Brazil, ended 16 days of business sessions and inspection trips at the nation's new capital, Brasilia, on 27 October, after announcing the winners of 16 prizes for papers presented to the Congress, and after deciding to hold the next Congress in Mexico, probably in 1963. Sessions of the X Pan-American Congress were held 12–19 October at Rio de Janeiro. On 20 October the delegates journeyed from Rio to Sao Paulo by train, on the Central of Brasil Railway.

In Sao Paulo, 21–26 October, the delegates visited railways installations and equipment manufacturing plants and attended the extensive exhibition of railway equipment at Sao Paulo's Ibirapuera Park. During the sojourn at Sao Paulo, delegates were taken to Santos on one day, down the famous inclined planes of the Santos-Jundiai Railway. On another day there was an excursion to Rio Claro on the Paulista Railway, to visit that company's workshops and its experimental eucalyptus plantation.

The main business of the Congress was the discussion and evaluation of 161 papers on a wide variety of technical railway subjects, the papers having been submitted to the Congress from nations

CONTINUED ON PAGE 48

Asian Railway Problems Were Subject of Tokyo Meet

The Second Asian Railway Conference convened at Tokyo last 11 October with introductory remarks by S. Sogo, president of the Japanese National Railways. Mr. Sogo, presiding over the opening sessions, welcomed top-ranking railwaymen from Burma,Taiwan, India, Japan, Indonesia, Republic of Korea, Malaya, the Philippines, Saudi Arabia, Thailand and the United Arab Republic, and from the United Nations Economic Commission for Asia and the Far East (ECAFE). The Asia and Far East representatives of the French Railways Equipment Board and the publisher of International Railway Journal were also present as observers.

Mr. Sogo, in his opening speech, described railways "as a modern dynamic force . . . an indispensible means of transportation", the importance of which "has not in any sense decreased. To the contrary, by operating in closer coordination with other means of transport—air, road and water— the railways are endeavoring to accentuate their strong points and compensate for any shortcomings, in order to establish a system of overall cooperation among them". Mr. Sogo predicted that "Japan's new trunk line, expected to be completed between Tokyo and Osaka in 1964, will introduce a new railway age in this country."

At two days of round-table conferences, discussions were held relating to the development of railways in the nations of the Near, Middle and Far East. Delegates stressed the need for formulation of transport policy to prevent waste and destructive competition during the current simultaneous development of railways and other transport. Inroads by these growing competitors "could at least be reduced, if not altogether prevented," it was suggested by M. S. Ahmad, director, transport and communications section of ECAFE, "by improving the quality and augmenting where required the railway

CONTINUED ON PAGE 50

BTC Conference Discussed Industrial-Current AC

Focusing attention on industrial-frequency AC electrification, and especially on British progress in the field, the British Electrification Conference drew over 450 delegates, 200 of them from 50 railway administrations in nearly 40 countries throughout the world. Held in London between 3 October and 10 October, the conference was organized jointly by the British Transport Commission, British Electrical and Allied Manufacturers Association, and Locomotive and Allied Manufacturers Association, and sessions were held at the Institution of Civil Engineers in Westminster.

The week-long program included the presentation of 41 technical papers on all phases of AC electrification. The opening paper, presented by BTC's chief electrical engineer, S. B. Warder, served as an introduction to the subject, covering the general considerations involved in the decision to adopt AC electrification and the work in progress. Other papers by experts from BTC and the manufacturers dealt with such subjects as power supply, overhead line design and construction, testing and research, signalling and communications, motive power, and rolling stock design.

During the conference delegates attended the opening of a large equipment exhibition at Battersea. Opening the exhibit, Minister of Transport Ernest Marples discussed the need for modernization of the British Railways; discussing the high density of traffic, he observed "Ninety-four per cent of the people coming into London every day use public transport. The other six per cent park in front of my house." Highway, he said, would be no solution. Citing the Los Angeles freeway system as an example of modern highway planning, Minister

CONTINUED ON PAGE 50

Rio de Janeiro; London; Tokyo

Congrés de Rio

Des expositions de matériel, des rapports techniques, ainsi que des visites aux installations et usines ferroviaires brésiliennes, voilà les points principaux du Dixième Congrès Ferroviaire Pan-Américain, duré seize jours du 11 au 27 octobre, fut fini à la nouvelle capitale Brasilia. Ce congrès a battu un record de présence avec les 160 délégués étrangers et les 345 délégués brésiliens.

Kongress in Rio

Material-Ausstellungen, technische Vorträge, Besichtigung brasilianischer Eisenbahnanlagen und Werkstätten füllten den X. Panamerikanischen Eisenbahnkongress, der 16 Tage dauerte und am 27. Oktober in der neuen Hauptstadt Brasilia seinen Abschluss fand. Der Kongress verzeichnete mit 160 ausländischen und 345 Brasilianischen Delegierten einen Teilnehmerrekord.

Congreso de Rio

Exhibiciones de equipos, conferencias acerca de asuntos técnicos, visitas a plantas ferroviarias brasileñas—he aquí el programa del Congreso panamericano de Ferrocarriles que el 27 de octubre se clausuró en Brasilia, la nueva capital del Brasil, depsués de una sesión de 16 días. El número de congresistas superaba toda ponderación—160 de paises ultramarinos y 345 del Bresil.

Conference asiatique

La seconde conférence asiatique des chemins de fer de Tokio a attiré les grands directeurs des chemins de fer de 11 pays du Proche, Moyen et Extrême Orient pour discuter les problèmes et visiter les chemins de fer nationaux japonais, e.a. au centre de recherches de la JNR ainsi qu'une exposition du matériel roulant et des voyages par le "Kodama" et le "Hatsukari".

Asiatischer Konferenz

An Tokios 2. Asiatischer Eisenbahnkonferenz nahmen hohe Eisenbahnbeamte aus 11 Nah-, Mittel- und Fernost-Ländern teil; Eisenbahnpläne wurden diskutiert und japanische Staatsbahn-Anlagen besichtigt. Höhepunkte der Reise waren Besuche bei den JNR Versuchszentren, eine Rollmaterial-Ausstellung, Fahrten in dem "Kodama" und neuen "Hatsukari".

Conferencia asiática

La segunda conferencia asiática de Ferrocarriles reunia personajes de relieve del Oriente en Tokio para discutir problemas ferroviarios y visitar unas instalaciones de los FC japoneses. Se apreciaban en alto grado unas visitas al centro de investigaciones de los JNR y una exhibición de material rodante, así como excursiones en el "Kodama" y el nuevo "Hatsukari".

Conference de Londres

Faisant ressortir les progrès réalisés dans l'électrification des British Railways, la Conférence de l'Electrification Britannique eut lieu à Londres du 3–10 octobre. 41 Rapports techniques traitant de la traction à courant industriel ont été lus; les délégués ont visité le premier projet CA réalisé par la BR à Manchester et y ont reçu des détails d'autres projets.

Londener Konferenz

Aufschluss über das Entwicklungsprogramm der Wechselstromelektrifizierung bei der British Railways gab die britische Elektrifizierungskonferenz vom 3.–10. Oktober in London. Behandelt wurden 41 technische Beiträge über verschiedene Aspekte des industriellen Frequenzbetriebes; die Delegierten besuchten das erste fertige Wechselstrom-Projekt in Manchester.

Conferencia de Londres

En la Conferencia Británica de Electrificación celebrada en Londres del 3 al 10 de octubre el desarrollo del programa de electrificación de los ferrocarriles británicos fué puesto en relieve. Los participantes discutieron 41 estudios sobre la acometida de corriente industrial, visitaron el primer proyecto de corriente alterna en Manchester llevado a cabo por los BR.

Eng. J. F. Capistrano do Amaral; Adm. Lucio Meira; Eng. Renato Feio; Eng. Helio de Almeida; Eng. Osiris Cabral; Eng. Mausicio Siqueira.

E. Huergo, Chairman, Permanent Committee.

PAN AMERICAN CONFERENCE CONTINUED

affiliated with the Pan-American Railway Congress Association.

Delegates were divided into five sections for the discussion of these papers; those found to be meritorious were recommended for publication, and there were a number of prize awards made for papers deemed to be especially commendable.

The delegates were taken on inspection visits to the two principal railway stations at Rio de Janeiro, and through a large signal box at Barra do Pirai on the Central do Brasil Railway (en route from Rio to Sao Paulo). There were journeys also on the Sorocabana Railway, on the Santos-Jundiai as already noted, and on the Paulista. Numerous equipment manufacturing plants were visited, among them the Fabrica Nacional de Vagoes at Cruzeiro; the Mafersa Heavy Forgings Plant at Caçapava; and the Mafersa, Fresinbra, Cobrasma, Soma and Sofunge plants at Sao Paulo.

Delegates were received by the governor of the state of Guanabara and there was a reception at the Presidential palace in Brasilia, at which the nation's minister of transport was the host. The transport minister also addressed opening and closing sessions of the Congress. The Brazilian Federal Railway System, the organizing committee, the permanent commission, three of the national delegations and several manufacturing companies were hosts at luncheons and dinners—a special feature being *al fresco* refreshments served in the plants of several companies.

The prize awards were provided by the Argentine government; the organizing committee, the Brazilian Federal Railway System; The General Electric Company; American Locomotive Company; Steel Peech & Tozer and Workington Iron & Steel Company of England; and by a committee of US suppliers, of which R. A. Williams of the Stanray Corporation was chairman.

The delegates were given an opportunity to see a great deal of Brazil's railway operations, most aspects of which are thoroughly modern technologically. There is a considerable mileage of centralized traffic control, and expanding dieselization and electrification.

Rio de Janeiro has, undoubtedly, the largest movement of suburban passengers to be found anywhere in the Western Hemisphere—the Central do Brazil handling in this operation more than 600,000 passengers daily.

The exhibition of equipment was probably as large as has ever been provided in Latin America—the only possible rival having been the exhibition in 1957 at Buenos Aires in connection with the IX Congress. Principal manufacturers of equipment and supplies from Brazil were joined by overseas producers in showing a wide range of modern railway devices, including diesel-electric locomotives and both freight and passenger cars; signal equipment; track maintenance machinery roller bearings; and materials-handling equipment.

The assembling of some of the exhibits involved considerable effort and ingenuity—since Ibirapuera Park, the exhibit site, does not have a railway line into it, the rolling stock and locomotives had to be brought in over the highways.

Attendance at the X Congress was the largest yet recorded at one of these Western Hemisphere assemblies—there having been 160 in attendance from outside Brazil and 345 from the host nation. These figures do not include members of families accompanying the delegates. All principal Western Hemisphere countries were represented. In addition there were visitors from other areas—Spain, Britain, France, Japan and Sweden.

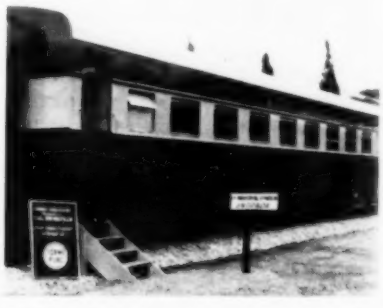
The French not only had a substantial delegation in attendance, but also a large exhibition, including a diesel-electric locomotive and track maintenance machinery. In addition, French authors presented nine technical papers to the Congress.

The authors receiving awards and the subjects of their papers were as follows:

- 25,000 Argentine pesos to Carlos Villafuerte (Mexico)—"Coordination of Railways".
- 10,000 Argentine pesos to José da Silveira Pontual (Brazil)—"Psychotechniques in Personnel Management".
- 25,000 Argentine pesos to Profirio Becerril (Mexico)—"Most Economical Railway Sleepers".
- 150,000 Brazilian cruzeiros to Isaac

Equipment Display

France was well represented.
La France fut bien représentée.
Frankreich war gut vertreten.
Buena representación de Francia.



Brazilian-built meter-gauge coach.
Voiture, voie 1 m, construite au Brésil.
Brasilien baut Meterspurwagen.
Coche métrico construida en el Brasil.

Maria Young (Argentina)—"Railway Tariffs under Highway Competition and Monetary Inflation".

- 100,000 Brazilian cruzeiros to Maurilio Menegale (Brazil)—"Diesel and Electric Traction".
- 500 US dollars to Armando Aquilera Darantes (Mexico)—"Electric, Diesel and Turbine Locomotives".
- 100 US dollars to M. Menegale (Brazil)—"Comparative Systems of Traction".
- 200 British guineas to Edgard Ghilardi (Brazil)—"Creosoting of Railway Sleepers".
- 200 British guineas to Floriano F. de Camargo (Brazil)—"Diesel-Electric Traction".
- 816 dollars to Luiz Alberto Linhares (Brazil)—"Accounting Methods".
- 15,000 Argentine pesos to Ralph Cramer (US)—"The Box Becomes of Age".
- 250,000 Brazilian cruzeiros to Paul Garin (US)—"Radioactive Tracer Research".
- 1000 US dollars to John Aydelott (US) for a paper on maintenance, repair and modernization of diesel locomotives.
- 816 US dollars to H. L. Decker (US)—"Rolling Stock Maintenance".
- 816 US dollars to E. Ghilardi (Brazil)—"Surveys".

It will be noted that two authors won two awards each. There was, in addition, a gold medal and certificate award to William Saunders (USA) for a paper on "Controls for Modern Transportation".

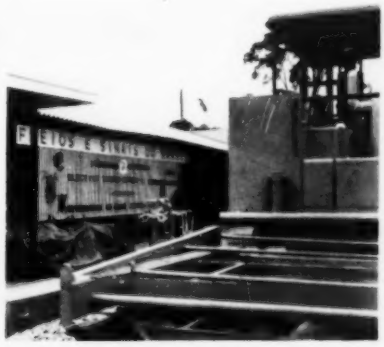
Papers were submitted in the Portuguese, Spanish, French and English languages. Insofar as possible, papers written in the Romance languages were made available also in English—and English papers were translated into Portuguese or Spanish. Where complete translations could not be furnished, summary translations were provided. Instant oral translation was provided at all formal sessions—delegates with earphones selecting either Portugese, English or Spanish versions of the discussions.

The chairman of the organizing committee for the X Pan-American Railway Congress (subsequently chosen as chairman of the Congress) was J. Francisco C. do Amaral, who heads the commission in charge of Brazil's Federal Railway System. The general secretary was Josè de Souza Baptista, staff officer to the president of the Federal Railway System.

The equipment exhibition at Ibirapuera Park, Sao Paulo, was organized and conducted under the name "Feira Internacional de Material Ferroviario" (FIMAFE) by a group of manufacturers under the chairmanship of Herminio Amorin Júnior, with Oswaldo Palma as secretary.

Featured Brazilian Rolling Stock and Machinery

Heavy-duty cars, built in Brazil.
Wagons poids-lourds, construits au Brésil.
Schwerfrachtwaggons in Brasilien gebaut.
Vagones pesados construidas en el Brasil.



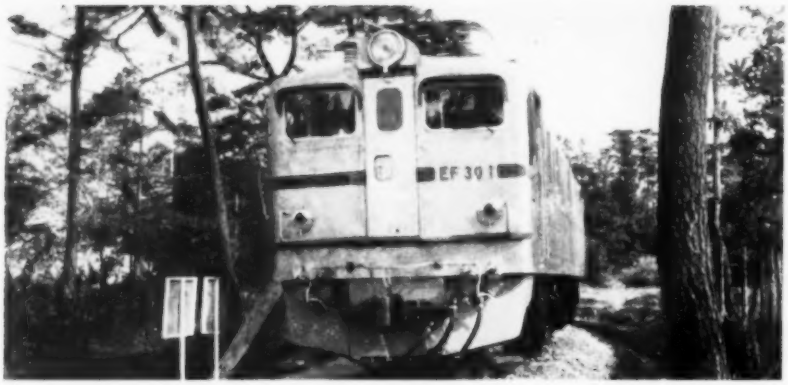
Fonseca Almeida's wide range of products.
Diversité des produits Fonseca Almeida.
Fonseca Almeida's vielfältige Erzeignisse.
Los productos de la casa Fonseca Almeida.

Overseas and Brazilian firms cooperate.
Coopération avec maisons étrangères.
Einsendungen in- und ausländischer.
Cooperación con casas extrangjeras.

Display by a Brazilian foundry.
Exposition d'une fonderie brésilienne.
Ausstellung brasilianischen Giesserei.
Exhibición de una fundición brasileña.

Principal Brazilian railways had exhibits.
Exposition des CF principaux brésiliens.
Brasiliens Eisenbahnen stellten aus.
Exhibiciones de los FFCC brasileños.

Built in Brazil, Japanese design.
Construction brésilienne, sur plans japonais.
Japanischer Entwurf in Brasilien gebaut.
Construido en Brasil, diseño japonés.



TOKYO CONFERENCE CONTINUED

services offered". He cited as an outstanding example the high-speed standard gauge "super railroad" being constructed between Tokyo and Osaka, where the most modern technological developments are to be employed.

Mr. Ahmad also discussed the need for inter-railroad cooperation and praised the achievements of the Regional Railway Training Centre at Lahore, Pakistan, set up in 1954 by cooperation of the UN and the government of Pakistan. Here railway operating and signalling officers from all Asia are instructed in the use, installation and maintenance of modern equipment and return to their own railways to instruct others.

Electrification was recurring subject whenever modernization was discussed. Mr. Karnail Singh, chairman of the Indian Railway Board, said that India looked to electrification in the transition from steam wherever density was in the range of 50 to 100 or more trains per day, with dieselization in less dense areas. To conserve resources and limit depletion of foreign exchange, steam would be retained, he explained, in areas where density was low and traffic requirements were being adequately met. Mr. Z. F. Wang, advisor to the Taiwan Railway Administration, said his railway hoped to electrify in the Taipei area within a decade.

JNR Conference

The Japansee National Railways, who played host to the delegates, arranged inspections trips over electrified lines and a demonstration of a new AC—DC silicon rectifier locomotive—a prototype with a year of service (16 additional units are now on order). Delegates traveled to Kyoto and Osaka on JNR's deluxe 12-car multiple-unit electric "Kodama," and also to Nikko on a special run of the new deluxe MU diesel train "Hatsukari", prior to its assignment to the 750-km Tokyo-Aomori run.

Highlights of the 10-day conference were visits to a railway exhibit featuring the latest equipment of the Japanese railway manufacturers, and to the JNR's new and extensive research instute just west of Tokyo. At the institute some 800 railwaymen are employed, including more

LONDON CONFERENCE CONTINUED

Marples said that if London had been laid out with similar highway transport in mind, the suburban road network would extend "from Leeds in the north to Dieppe in the south".

Included in the conference program was a visit by special train to the Manchester-Crewe electrification, first of the BR 25-kv AC installations to enter regular service.

Opened several weeks before the conference, the Manchester-Crewe section covers 50 km of line on the BR's London Midland region, and is the first section of an eventual AC operation linking Liverpool and Manchester with Euston Station, London.

Although relatively short, the Manchester-Crewe scheme was three years in completion. Apart from the electrification itself, the project involved the virtual rebuilding of the line.

Work included the installation of 5500 masts and structures to carry the overhead line; complete resignalling was carried out, color-light signals replacing semaphores and control concentrated primarily in three power signal boxes, with automatic train control installed throughout.

Britain's New

Track circuits were specially designed for operation in conjunction with 50-cycle AC; on shorter sections DC circuits of the single-rail type are used, while longer sections use a 75-cycle AC double-rail type with specially-designed impedance bonds. Because of the presence of 1500-volt DC traction overhead on adjacent lines at Manchester (Piccadilly), an 83-1/3-cycle AC system was installed.

Specially-shielded cables in ground-level troughs were installed, replacing pole-carried lines. Civil engineering work involved easement of curves and general track modernization. Another major engineering task was the raising of bridges to provide clearance for overhead.

For operation of the line BR uses Bo-Bo locomotives of two types, ranging from 3000 to 3310 hp. Type A, the majority, is designed for 160-km/h speeds with passenger trains, 88-km/h speed with 950-ton freight trains. Type B, with lower gear ratios, is designed for freight working, with an 88-km/h speed with 1250-ton trains.

Multiple-unit trainsets are also used for passenger service. The four-car sets consist of a driving battery trailer, motor

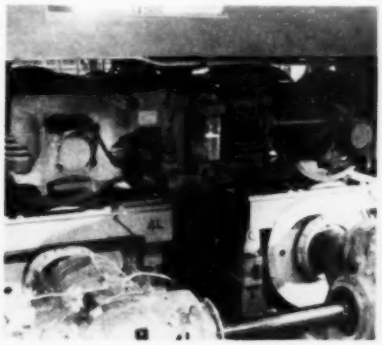
Drew Top-Level Officials for Discussion of Problems

than 300 college graduates, conducting both applied and basic research in all fields of railway technology. Much of the research is presently related to equipment and roadway designs for application to the new Tokyo-Osaka standard gauge trunk line. Pantographs, cars and bogies are being studied and designed for the 200-km speeds that are to be routine on the new line high-speed "super-railway."

At the closing session on 20 Oct., the delegates voted in favour of a motion that subsequent conferences be held in New Delhi in 1961, probably in December, and every two years thereafter at locations to be selected. A proposal to change the name of the conference to reflect more accurately the areas it covers (Near East, Middle East and Far East) was deferred until 1961.

Mr. Sogo was reelected chairman of the conference and His Royal Highness Sultan Bin Abdul Aziz, Saudi Arabia's, Minister of Communications was elected vice chairman. Karnail Singh, chairman of the Indian Railway Board, was elected vice chairman.

JNR's president S. Sogo was host to conference; delegates visited railway research center, saw prototype container trains.
S. Sogo, président de la JNR était l'hôte; les délégués ont vu le centre de recherches de la JNR, et le prototype des trains container.
Kongress-Gastherr war S. Sogo, Präsident der JNR; Delegierte besuchten ein Eisenbahn-Versuchszentrum und einen Wagen-Prototype für Behälter.
El presidente de JNR, Señor Sogo, era el anfitrión; los participantes inspeccionaban el centro de investigaciones y un tren container.



AC Projects Were Highlight of London Conference

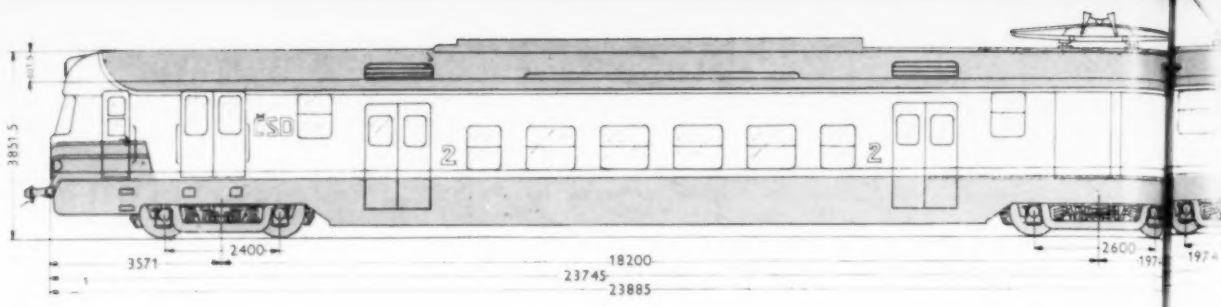
coach, non-driving trailer, and driving trailer. Motor coaches have Faively pantagraphs, Brown Boveri air-blast circuit breakers, and mercury-arc rectifiers. Four axle-hung traction motors are used. The sets have an empty weight of 151.9 tons, and will accommodate 19 first and 344 second-class passengers.

On the last day of the conference delegates also visited work in progress in the London suburban area. First of these projects to be completed was the Liverpool Street-Shenfield-Southend line. The line, originally electrified at 1500 volts DC, was converted to AC operation over a weekend and went into service on 7 November after 18 months of preparation. The changeover will allow the line to be integrated with other AC projects.

To minimize construction problems, the line uses 6.25 KV throughout; as all BR AC equipment is designed for operation on either 6.25 or 25 kv, no problem of equipment interchangeability arises. Existing catenary was retained, but the changeover involved replacement or modification of insulators, installation of booster transformers, and altered switching and feeding arrangements. Signal circuits

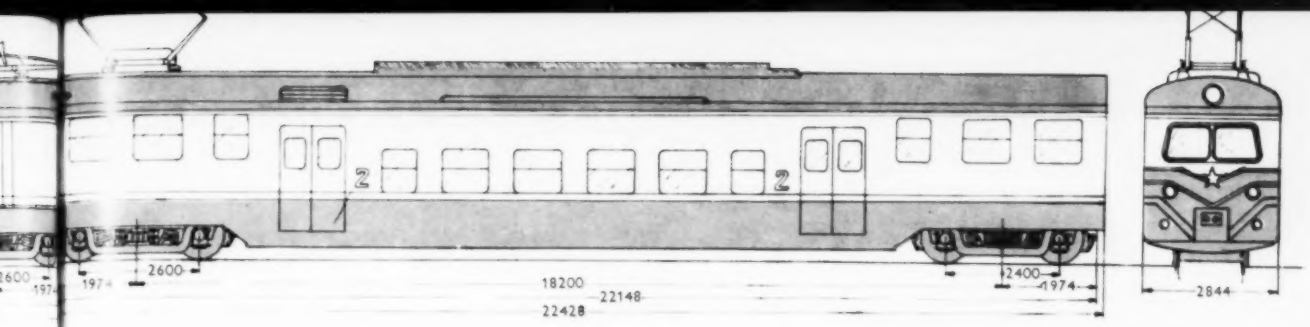
CONTINUED ON PAGE 66

Delegates to London conference discussed construction techniques, saw new rolling stock, and visited work in progress on BR.
Les délégués ont discuté les méthodes de construction, ont vu le nouveau matériel roulant et les travaux en cours aux BR.
Delegierte der Londoner Konferenz besprachen Bautechniken und besichtigten neues Rollmaterial und BR Anlagen im Bau.
Participantes discutieron varias métodos de construccion, inspeccionaron nuevo material rodante y visitaron obras en construcción en los BR.



Czechoslovakia: New Trainsets

New Czech trainsets have clean outside and interior design; two-level construction speeds loading.
Nouvelles rames tchèques à lignes simples et attrayantes; la construction à deux niveaux accélère le chargement.
Der neue tschechische Wagenzug, innen und aussen formschön; schnelles Verladen durch zweistufige Bodenkonstruktion.
Nuevos trenes checos de exterior e interior sencillos; dos niveles aceleran el cargo.



Feature Two-Level Design

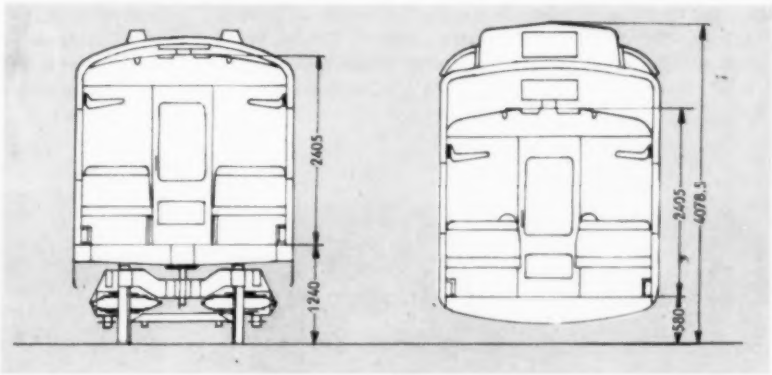
By dropping the floor between bogies, doors are only just above track level on the Czechoslovakian State Railways' new EM 475.0 four-car suburban electric train set. By having floor and doors at virtually the same level as the Czech low-height platforms, entry and exit is easier and passenger movement quicker. This enables a greater number of passengers to transfer in a given time.

Each four-car set is composed of two identical halves. The control car of each half incorporates—at normal height above the rail—a driver's cab, baggage compartment and a small passenger compartment. On the lower level are two sets of double doors, flanking a large passenger saloon. At the opposite end to the cab are a toilet and electrical compartments. The second car has small passenger compartments at either end above the bogies, plus a toilet, while at lower level are two sets of double doors and a large central saloon. Total seating capacity of a four-car set is 302 with space for a further 380 standing passengers.

Each car runs on two four-wheeled Pennsylvania-type bogies. One bogie per car is powered with two axle hung self-ventilated traction motors each having a one-hour rating of 255 hp and a continuous rating of 220 hp. Current collection is by roof-mounted pantographs, one per car, the line voltage being 3,000-volt DC Because of the type of service for which it is intended—frequent stops and short distances between stations—a high rate of acceleration has been aimed at. The accelerative rate is 2.5 km/h/sec. which means in 30 seconds, and a distance of 315 meters, a speed of 75 km/h is achieved. Rapid deceleration is obtained by using regenerative braking which feeds current back to the conductors or to starting resistances. Apart from regenerative braking there are electrically controlled air brakes. Maximum speed is 100 km/h.

Sets can be run in multiple-unit and couplers are of the automatic multi-connection type embodying control lines and air brake lines. Because of this, the sets are without the usual side buffers.

Easy-to-maintain materials have been used on the interior surfaces of the cars. The upper part of the walls is covered in a plastic material, while the lower part is covered in plastic leathercloth. The tubular metal-frame seats are also upholstered in plastic material. Baggage racks run lengthwise down each side of the car and have metal frames strung with "silon" net. The temperature inside the cars is kept at the required level by automatically controlled electrical resistance heating in conjunction with hot or cold air. A ventilator in each vehicle draws in cold air, cleans it and heats it as required. Lighting is by two rows of fluorescent tubes. The train-set was built by Vogónka Tatra.



Nouvelles rames electriques tchéques

Nouvelles rames de 4 voitures fournies aux Chemins de fer tchéques, à grande accélération et à deux niveaux permettant un chargement et un déchargement plus rapide.

Tschechischen Triebwagenzüge

Neue, der tschechischen Staatsbahn gelieferte Vier-Wagentriebzüge zeichnen sich durch hohe Geschwindigkeit aus; ungewöhnlicher Zweistufen-Boden beschleunigt Ein- und Ausladung.

Ramas Electricas Checas

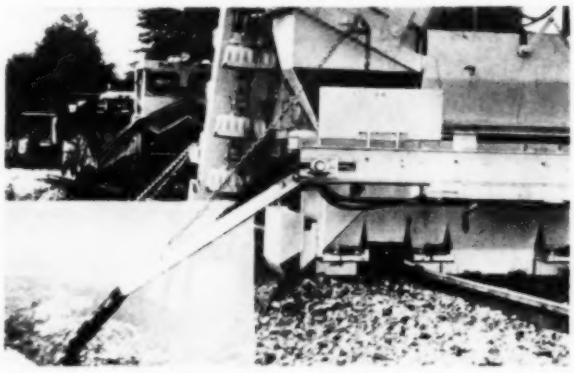
Nuevas ramas electricas de cuatro unidades para los ferrocarriles checos; gran aceleración, construidos a dos niveles para cargo y descargo más rápidos.

Products of Interest from

Vokes offre des nouveaux joints de dilatation en forme de soufflet.
Vokes bringt neue Faltenbalg-Dehnungsfugen.
Vokes ofrece una nueva junta de dilatación para tuberias.

Bellows Joints for High-Temperature Piping

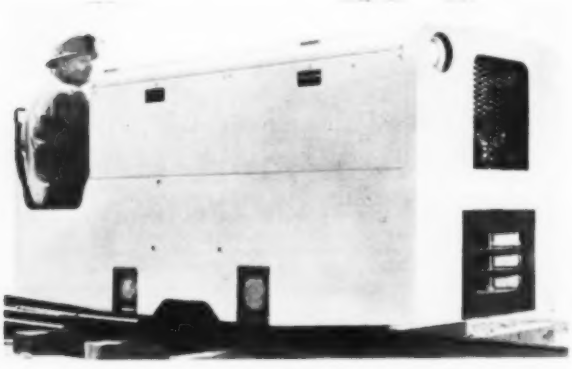
Designed to absorb expansions and contraction of piping and ducting systems, the Vokes Genflex bellows joints are suited for use in diesel-engine exhaust systems, steam heat lines, and many other applications. Available with all types of couplings, the units are fabricated from 18/8 cold rolled stainless steel; for special situations other metals are available. *Vokes Genspring Ltd., Henley Park, Guildford, Surrey, England.* **IRJ 1**



Mécanisme de nettoyage pour le distributeur de ballast McWilliams.
Schotterverteiler McWilliams mit neuer Reinigungsvorrichtung.
Difusor de balasto McWilliams con nuevo dispositivo para limpiar.

Cleaning Attachment for Ballast Distributor

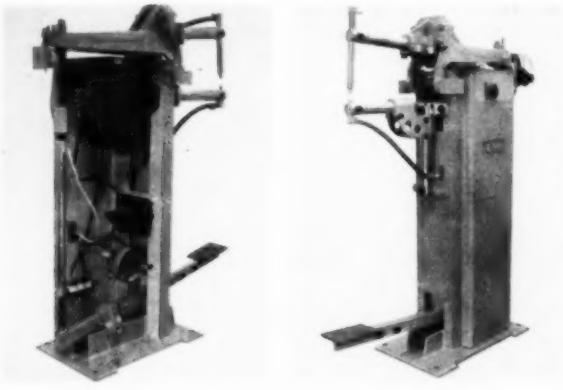
The McWilliams Ballast Distributor has been modified to include a ballast cleaning mechanism. Fitted with a vibrating screen, the cleaning unit removes dirt from the ballast and deposits it clear of the track shoulder; provision can be made for carrying dirt across adjoining tracks and the unit can be installed on any existing McWilliams ballast distributor. *Railway Maintenance Corporation, Box 1888, Pittsburgh 30, Pennsylvania, U.S.A.* **IRJ 2**



Des nouvelles locomotives diesel Greensburg disponibles pour les mines.
Neue Greensburg Diesellokomotiven für Grubengebrauch.
Nuevas locomotoras mineras diesel de Greensburg.

New Series of Diesel Mining Locomotives

The new series of Greensburg diesel mining locomotives, available in capacities from 2.5 to 25 tons, uses a torque-converter drive through double-reduction constant-mesh gearing with power reserve. The units are fitted with an exhaust-gas conditioner which cools exhaust gasses to a maximum of 71° C. while removing solid combustion particles. *National Mine Service Co., 2530 Koppers Building, Pittsburg 19, Pennsylvania, U.S.A.* **IRJ 5**



Nouvelles machines pour le soudage par points.
Neue leichte Punktschweissmaschinen für Blecherzeugnisse.
Nuevas maquinas ligeras para soldar por puntas para chapas.

Light-Duty Spot-Welders for Sheet Metal

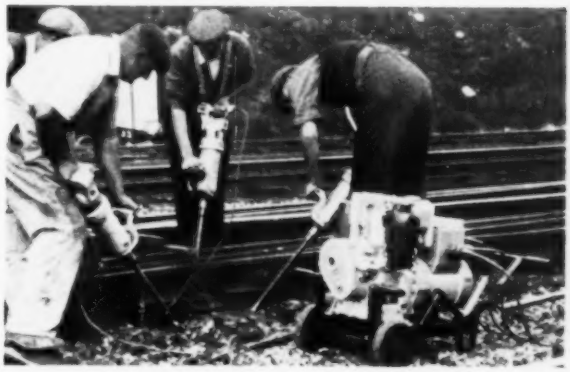
Two new spot-welding machines have been announced by Electro Mechan-Heat. The smaller 8-kva unit is available in two models, PM 11 and PM 11.V; the 16-kva unit PM 21 is also available in two models. The units are designed for light-gauge sheet metal fabrication and feature simple operation and low power consumption; they are available for 230 and 440-volt DC or AC. *Electro Mechan-Heat Ltd., Lower Teddington Road, Kingston-upon-Thames, Surrey, England.* **IRJ 6**

Railway Suppliers

Nouvel instrument d'essai pour systèmes d'injection diesel.
Neues Prüfgerät für Dieselkraftstoff und Einspritzsystem.
Nuevo instrumento para problar sistemas e inyección diesel.

Tester for Diesel Injection and Fuel Systems

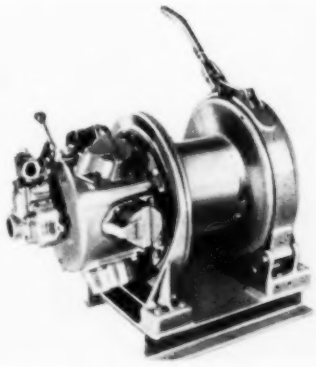
The Injectester Mk II is designed for testing of diesel engine fuel-pump and injection systems under actual operating conditions. All components of the pump are tested without removal from the engine, and complete testing of a four-cylinder pump can be accomplished in 15 minutes. Injectors may also be tested under normal conditions. The unit weights only 2.25 kg. *Dunedin Engineering Co. Ltd., 73/75 Mortimer Street, London W. 1, Engeland.* **IRJ 3**



Kango introduit générateur diesel léger pour bourreuse de ballast
Kango bringt leichten Dieselgenerator für Gleisstopfmaschine
Kango ofrece generador diesel portable para pisones de lecho.

Portable Generator for Ballast Tampers

The new Kango portable generator is designed for use with the same firm's electric ballast tampers and other uses. Powered by the HATZ E.75 high-speed four-stroke diesel engine, the generator will deliver 3000 watts at either 110 or 240 volts, either DC or 50-cycle AC. The unit is mounted on a two-wheeled steel frame and weighs approximately 110 kg. *Kango Electric Hammers Ltd., Lombard Road, Morden Road, South Wimbledon, London S.W., 19, England.* **IRJ 4**



Nouvel appareil pneumatique léger de levage à plus grande capacité.
Neuer pneumatischer Flaschenzug mit grösserer Leistung.
Nuevo aparejo neumático para materiales de capacidad aumentada.

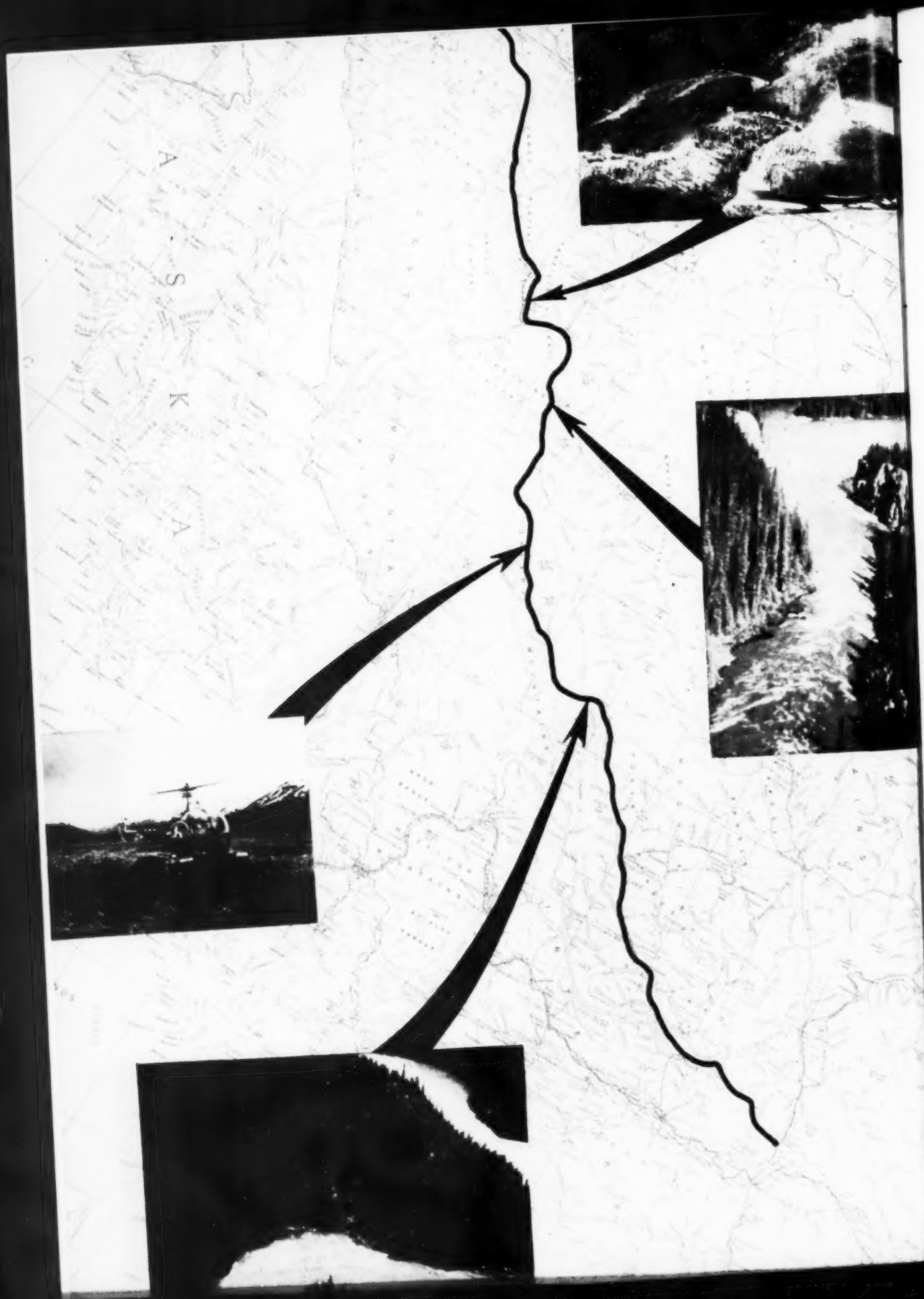
High-Capacity Air-Operated Materials Hoist

The Ingersoll-Rand K6U hoist offers easy portability with greater lifting power for the handling of construction material and other heavy loads. With a capacity of 3150 kg, the K6U has a reversible six-cylinder air engine and a lifting speed of 18 meters per minute. Drum capacity is 180 meters of 16-mm wire rope or 120 meters of 19-mm line. Controls can be provided for completely remote operation. *Ingersoll-Rand Company, 11 Broadway, New York 4, New York.* **IRJ 7**

Nouvel appareil pour application métal sur métal au pulvérisateur.
Neue Einheit für metallisches Oberflächenverfahren.
Nuevo aparato para recargues de metal.

Metal-Spray Process for Resurfacing Jobs

A new surfacing process, designed for hardfacing and brazing operations, allows powdered metals to be simultaneously sprayed and fused on a base metal by means of a special torch tip that sprays the metal powder through an oxy-acetylene flame. The unit is specially suited for building up high-melting-point alloy deposits, such as surfacing pistons, valves, and other parts faces in railway equipment. *Airco Company International, 150 East, 42nd Street, N.Y. 17, N.Y.* **IRJ 8**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Canada Maps New Railway Line

The history of North America has been largely one of frontiers and their developments. There are not many frontiers left today, but one of the most important—the fertile Canadian and Alaskan north with its abundant timber and mineral wealth—is following the classical pattern of frontier history; first the pioneers, then the railways, and only after the railways a full development of the land's riches.

Northern Canada is indeed a railway frontier; in almost the only major North American railway construction in recent years, rails have pushed northward to tap the iron ore of Quebec and Labrador and the rich agricultural storehouse of British Columbia's Peace and Fraser Rivers.

Now one of the last great frontiers—northern British Columbia west of the Rocky Mountains—may be developed by one of the most ambitious railway-projects—the 1125-km Pacific Northern.

How does a railway-builder—in this case Swedish financier Axel Wenner-Gren's B.C. Development Co. Ltd.—set about building a railway of such length through sparsely-settled country, almost devoid of roads and inadequately mapped?

The general requirement was for the projection of a railway line extending from the neighborhood of Prince George north to the Yukon border; any line projected was to compatible with a possible subsequent extension into the Yukon Territory and on to Alaska.

The geography of northern British Columbia and the Yukon presents several possible rail or highway routes, and various routes have been projected during the past quarter-century.

The Alaska Highway, built during World War II for military purposes, was the first of these to be actually built, and is now extensively used for cargo trucking to Alaska and the Canadian far northwest. It is not, however, well adapted to the shipment of large amounts of the bulk commodities, such as timber, cut lumber; and ore, that make up the principal wealth of the area.

During the war period, the US Army, faced with the problem of heavy traffic on what was then an extremely primitive road, surveyed a route for a possible railway extending north from Prince George along the so-called Rocky Mountain Trench; the Trench, consisting of river valleys along the western slope of the Rockies, provides an almost straight route running north-northwest.

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Nouveau chemin de fer pour le Canada?

L'histoire de l'Amérique du Nord en est principalement une de frontières et de leur développement. Dans quelques années si les plans actuels se réalisent comme prévus, la région vaste et non encore exploitée du Canada septentrional à l'ouest des Rocky Mountains, serait rendu accessible par une des propositions les plus ambitieuses dans le domain ferroviaire américain c.à.d. la proposition du Pacific Northern Railway. Selon le project la ligne débuterait d'une jonction avec la ligne Prince George—Dawson Creek de la Pacific Great Eastern, récemment achevée, et la PNR rendrait ainsi accessible à une exploitation économique une nouvelle région immense. La PNR doit encore faire face à d'obstacles formidables tant financiers que législatifs, mais quand cette ligne sera construite, elle suivra une route établie par les méthodes d'arpentage les plus modernes. Actuellement, l'arpentage est l'histoire important de la PNR.

Neue Eisenbahn für Kanada?

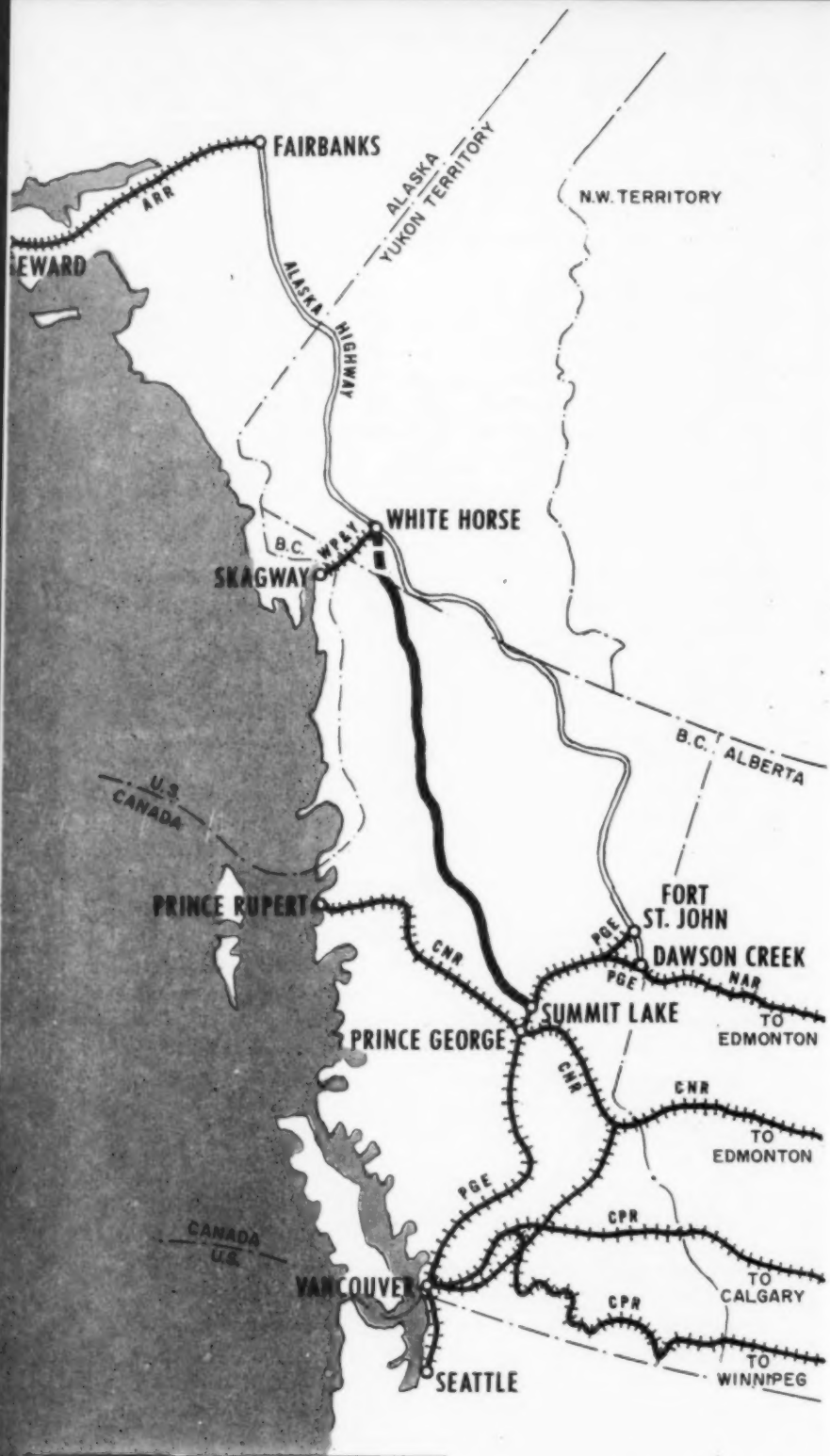
Die Geschichte Nordamerikas ist allgemein die der Grenzen und ihrer Erweiterung. In einigen Jahren, wenn die heutigen Pläne verwirklicht sind, wird das weite und unberührte Gebiet Nordkanadas, westlich der Rocky Mountains, dank des grossartigsten amerikanischen Eisenbahnbauprojektes der letzten Jahre—des schwedischen Finanziers Axel Wenner-Gren's Pacific Northern Railway, erschlossen. Es ist geplant, bei einem Knotenpunkt der kürzlich fertiggestellten Prince George —Dawson Creek Linie der Pacific Great Eastern zu beginnen; hierdurch würde die PNR der Wirtschaft ein riesiges neues Gebiet erschliessen. Die PNR steht vorläufig noch vor grossen finanziellen und gesetzlichen Hindernissen. Aber wenn diese Strecke fertig ist, dann wird sie den modernsten Vermessungsmethoden entsprechen. Die Vermessung ist heute die wichtige Aufgabe der PNR.

Nuevo Ferrocarril Para el Canadá?

La historia de la América del Norte ha sido determinada en gran parte por las posibilidades de desarrollo de regiones vírgenes. En algunos años, si los proyectos del presente se realizan, la región vasta y poco desarrollada del Canadá septentrional al oeste de los Rocky Mountains será abierta por uno de los proyectos más transcendentales de los ferrocarriles norteamericanos de los últimos años—el Pacific Northern Railway del financista sueco Axel Wenner-Gren. Este ferrocarril abrirá una región enorme al desarrollo económico. Además de esto una alarcamiento de esta línea podría servir el desarrollo de Alaska, región tanto ávida de transporte. El PNR tiene que superar aun enormes dificultades de carácter financiero y legislativo, pero una vez en construcción, el trayecto será determinado según el método más moderno de agrimensura.

Though the Trench provides a route with relatively easy grades, the planned building of major hydro-electric projects along two of the rivers making up the Trench system—the Finlay and the Parsnip—would flood a considerable length of the route. The cost of building above maximum water level was ruled out as unnecessarily expensive, and it was also observed that the flooding of the Trench would provide a navigable waterway completing directly with the railway over much of its length.

With the Trench route ruled out, attention turned to a route using the natural watersheds of the plateau region between

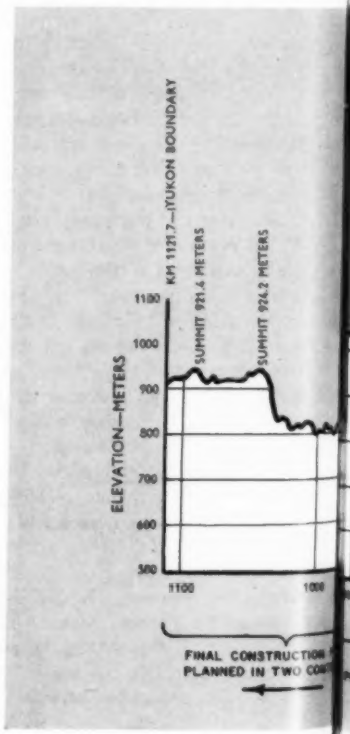


New Pacific Northern would link main lines of Canada and US with potentially-rich undeveloped territory, eventually with Alaska.

Le nouveau Pacific Northern relierait les lignes principales du Canada et des Etats-Unis aux territoires non développés.

Die neue Pacific Northern will Hauptverbindungslinien von Kanada und den USA mit potential-reichem unerschlossenem Gebiet.

El nuevo Pacific Northern conectaría las lineas principales del Canadá y EEUU con un territoria rico y poco desarrollado.



the Rockies and the Coast Range. The route finally adopted as most promising extended northwest from the line of the recently-built Pacific Great Eastern Railway at Summit Lake through some 320 km of rolling, heavily wooded country, characterized by broad, flat valleys, to Tachie, then along the eastern shores of Stuart, Trembleur, Takla and Bear Lakes. From the end of the lake chain the proposed route followed the valleys of the Sustut and Skeena Rivers and their tributaries to Damdochax Lake, then along the Nass River to its headwaters. From Nass Summit the route followed the Klappan and Skeena Rivers, and then the Tuya and Teslin valleys past Teslin Lake to the Yukon-B.C. border.

Before the initial reconnaissance was made, certain desirable physical standards were laid down for the proposed route. If possible the standards of the recently-built Prince George-Fort St. John-Dawson Creek portion of the PGE were to be followed—1.75% maximum gradient and 12-degree curves.

(As finally laid out, the route has a maximum gradient of 1.7% between the Stikine and Dease Lake. No other location has a compensated grade of more than 1%; except for two curves of 10 degrees, maximum curvature is 8 degrees and 87% of the line has curves of 6 degrees or less.)

During initial reconnaissance the general route was sketched on maps with a scale of one inch to 14 miles; mileages were scaled roughly from the maps, with the addition of a 5% to 10% correction figure, and approximate elevation figures were obtained by correlating altimeter readings from the helicopter used in the reconnaissance with elevations shown on the maps.

From the initial survey an approximate length of 1220 km was obtained; subsequent detailed surveys produced an actual figure of 1121.71 km (697.15 miles).

For the second stage of the study—detailed mapping of the route—an aerial survey was decided upon, and arrangements were made with several Canadian aerial survey and photomapping firms to carry out this stage of the work.

A major problem was presented by the scarcity of triangulation stations in the rolling, heavily wooded southern portion of the route. In this section, in order to provide ground control locations to be used as reference points in the aerial photomapping, extensive ground traverses were required, and the heavy timber required considerable cutting of sight lines. The consulting engineers began the task of establishing ground control stations in the southern section as soon as weather permitted in 1959.

The northern section is commanded by high mountains close to the proposed route, and on the summits of these peaks triangulation monuments had been established by federal and provincial government authorities; from these mountaintop locations both vertical and horizontal control points were located by further triangulation. The work was carried out by specialists from the aerial survey firms, using a light seaplane for access to the many lakes in the area and a helicopter to transport men and instruments to the mountaintop triangulation stations.

Ground control consisted of a network of large markers, easily visible from the air, in established locations. With the location of ground control points established, the aerial photographs were coordinated with the network to produce accurate topographical maps with a scale of 1 : 4800 and contour lines at intervals of 3.048 meters (10 feet) sufficient for projecting the rail route in the required detail.

To provide a continuous reference system throughout the length of the project, surveyors adopted the grid

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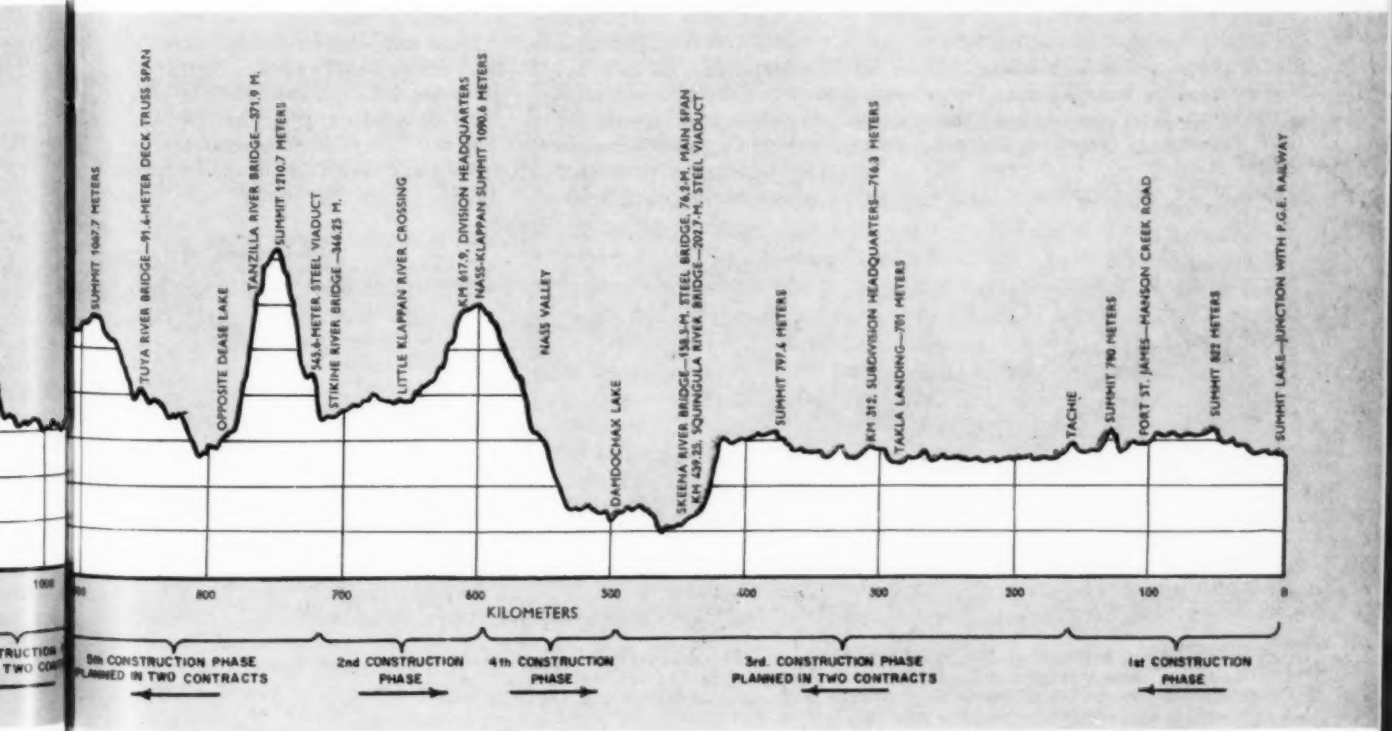


system employed in polar air navigation. Using a north-south grid line based on Centre Peak, approximately 320 km from Prince George, a rectangular grid system was laid out. Along this line, but only there, grid north and true north coincided. Other grid co-ordinates were calculated from the true geographical co-ordinates.

With grid locations plotted for the field control locations, stereo-plotting instruments were employed to determine the grid locations for a number of intermediate points, providing the additional control necessary for the detailed plotting of contour lines, topographical features, and other details. Because of the variable position of north in the grid system, the relationship between grid north, true north, and magnetic north was shown on each map sheet.

As aerial surveying and mapping progressed, reference material was provided for ground parties investigating the construction and engineering conditions which would be encountered.

The route, as finally adopted, offers relatively easy construction. The 425 km from Summit Lake—proposed junction with the PGE—to Bear Lake lies mainly in favorable valleys with a formation of clay, hard pan and boulders. The chain of lakes beginning at Tachie is already in use for the rafting of timber, and provides a natural water route of over 190 km for the shipment of construction material, machinery and supplies needed in the building of the rail line. A 64-km highway provides a supply route between the Canadian National at Vanderhoof and Fort St. James on Stuart Lake.

The section from Bear Lake to Dease Lake, 370 km, is rugged, and would require much heavy construction, including major steel and concrete bridges at the crossings of the Skeena, Little Klappan and Stikine rivers. At the crossing of the Skeena, ground parties noticed driftwood high on the banks, indicating very high crests, and the bridge was planned with a superstructure high above normal water level and a relatively long span.

The plans for the crossing of the Stikine call for a steel bridge of 346 meters between ballast-wall faces. Both an arch and a three-span continuous truss on concrete piers were considered, and after study of the canyon walls indicated sound footings a 140-meter spandrel-braced, three-hinged arch was selected. Steel viaducts of 152 and 54 meters will join the arch to the ballast walls.

While two major bridges would be required neither would be as large or expensive as those built for the PGE over the Fraser at Prince George or the Peace at Taylor Flats. Four smaller bridges would be required, but otherwise pile trestles, steel beam spans, and deck or through plate girder bridges would be adequate.

This section also includes the two highest summits of the line, 1095 meters between the Nass and Klappan valleys and 1210 meters between the valleys of the Stikine and Tanzilla Rivers. An alternate route was also considered, crossing the divide between the Skeena and Little Klappan Rivers rather than that between the Nass and Klappan; though the alternate route would have saved 20 miles of line, the pass is 244 meters higher than the Nass summit, and survey parties found nearly half a meter of snow on the ground in mid-June.

Access to this section for construction would involve considerable difficulty. A truck road presently connects Dease Lake with the Alaska highway, and another road is being built to connect Dease Lake with the port of Stewart. New road construction would be required to reach the Klappan River; heavy equipment would cross the Stikine and Klappan on ice during the winter to avoid heavy bridge construction.

The 330-km route from Dease Lake to the B.C.-Yukon border presents difficulties in the crooked and deeply-eroded Tuya River valley, where a great deal of sliding blue clay makes for considerable construction problems; heavy grading would also be necessary from the south end of Teslin Lake to the summit at Gladys Lake. Otherwise the grading should be relatively easy.

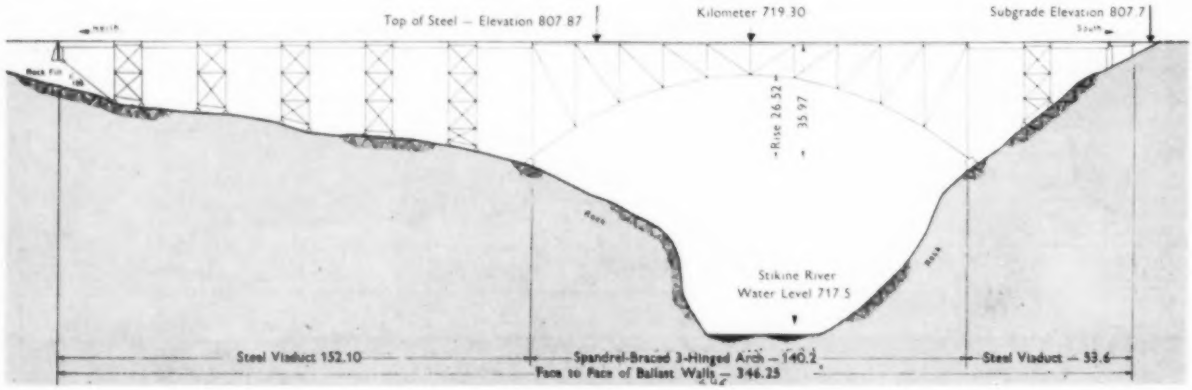
Cost estimates were prepared on the basis of nine contract sections, to be completed in six stages. Sections were established according the geography, amount of grading to be done, and availability of access without an extensive system of roads.

Sections were also considered with the desirability in mind of moving material to major bridge sites by rail and using rail-based equipment in their construction.

The first phase of construction would complete the line from Summit Lake to Tachie, approximately 160 km. By awarding two contracts, one for the clearing of timber and the other for main grading, the section could be completed in about two years.

Phase two would work south from the Stikine near km 725 to Nass Summit at about km 605. Access would be by road from the Alaska Highway and Stewart.

In the third phase, two separate contracts would extend the line 160 km from Tachie to Bulkley House, and from



Steel arch bridge over Stikine River—346 meters between ballast walls—would be PNR's biggest, most costly.
Le pont en arc en acier sur la rivière Stikine serait le pont le plus grand et le plus couteux de PNR.
Stahlbogenbrücke über den Stikine Strom—346 m zwischen Steinmauern—die grösste und teuerste für PNR.
Puente en arco de acero encima del rio Stikine—346 m entre los lechos de balasto—seria el más grande el PNR.

Bulkley House to near Damdochax Lake, at km 500. Construction forces would be supplied from the waterway extending between Tachie and Bulkley House. The bridges across the Squingula and Skeena between km 435 and km 450 would require large quantities of structural steel, and presumably would be built only after track has been laid to the bridge sites.

Construction from Nass River summit to Damdochax Lake would be included in the fourth phase, with heavy equipment moved in during the winter freeze. On completion of the grading track would be laid to make possible the supplying and constructions of the Stikine Bridge by rail. Two contracts would be involved in the fifth phase, covering construction from the Stikine crossing to Thirty Mile Lake and from Thirty Mile Lake to Prairie Lake, near km 940. Three major bridges—a 545-meter viaduct over a gully at km 740, a 370-meter viaduct over the Tanzilla River and a 92-meter deck truss over the Tuya River—would be built in this section.

The final phase, from Prairie Lake to Teslin Lake and Teslin Lake to the boundary, would also be awarded in two contracts.

Construction costs for the entire line have been estimated at approximately $260 million (Canadian) based on current costs as of December 1959. Aside from basic construction costs for grading and track, the figure includes $4.9 million for terminal facilities at Summit Lake, $1.8 million for the northern terminal, and $3.5 million for a division and two subdivision headquarters. Communications and signalling facilities, based on a microwave system similar to that used on the Pacific Great Eastern, are estimated at $17 million.

From an operating standpoint, the layout of the railway indicates two operating divisions, with division headquarters near Nass Summit.

On 28 June of this year, the PNR took its first step toward actuality with clearing of ground for the terminal at Summit Lake. Admittedly a token move, the construction is still regarded by the line's backers as the "first legal spike" under terms of a 1957 agreement with the British Columbia provincial authorities calling for work to begin before 1 July 1960.

While only nominal construction has been accomplished, the engineers have combined ingenuity, hard work and the most modern techniques to lay out a first-class railway of imposing proportions.

Pacific Northern: Unanswered Questions

Engineering skill and modern survey methods have answered two important questions about the Pacific Northern proposal—"Where?" and "How?". Not so easily answered are the equally important questions "Who?", "Why?" and "When?". Until they are answered, the PNR is likely to remain a "surveyor's railway."

"Who" would presumably be the Wenner-Gren group, but charges have already been leveled that aid from Canada's federal government would be needed to build the line, and no such aid has been committed. There have been persistent rumors of U.S. interest in the line as part of an all-rail link to Alaska—but again nothing concrete has developed. Prospects of U.S. participation in the project were, on the contrary, considerably dampened when the Alaska International Rail and Highway Commission received a report prepared by the Battelle Memorial Foundation of Columbus, Ohio.

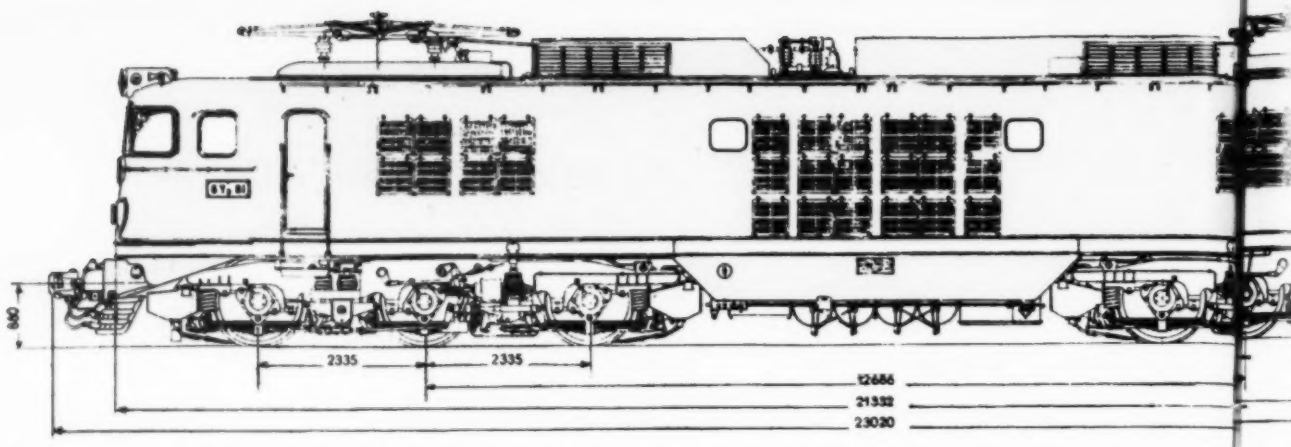
The report put construction costs for an Alaska rail link at $400 million, and estimated that an annual operating subsidy of $34 million would be needed to keep the line operating once finished. The report questioned whether traffic potential would warrant the expense, suggested that improved seaborne handling of rail cars, containers and highway trailers and an improved highway system would better serve Alaska's needs.

"Why?"—the only justification for the line would be traffic potential. While there is no doubt that the southern portion of the line taps valuable and vast timber reserves, the existence of good water transport, via the chain of lakes and rivers, could well cut into revenue from this source, at least in the summer months, with timber shipments beginning their journey at Tachie or even bypassing the PNR entirely in favor of the relatively short truck route from Fort St. James to the CNR.

Traffic from the line's northern section is even more uncertain. Shipments of asbestos from mines near Watson Lake, which now travel by truck to Whitehorse, by rail on the narrow-gauge White Pass and Yukon to Skagway and then by ship, would undoubtely move via PNR, but aside from this source, traffic would depend on the finding and successful development of mineral resources that could be economically produced. Aside from such possible—but uncertain—mineral resources the region has little if anything to offer as local traffic. A logical extension of the line to Whitehorse would tap existing traffic potential from the Yukon basin, but this area is already served by the WP&Y-ship route and by the Alaska highway. In any case such an extension, logical as it might be, would require approval which has not been given.

"When?"—The PNR will become accomplished fact only when and if the questions of "Who?" and especially "Why?" can be satisfactorily answered. Perhaps the first 160 or so km of line might find potential traffic as a modest lumber line, but construction of even a local feeder of this sort must wait for the "certificate of public convenience and necessity" which must be issued by the provincial Public Utilities Commission under British Colombia law—and to date the certificate has not been issued.

Until the unanswered questions are answered, the financial and political obstacles overcome, the PNR will remain what it is now—a complete railway in blueprint form, ready and waiting to be built.



New French built Co-Co electric is one of two types on Chinese Railways; 6000-hp units weigh 138 tons.
Nouvelle locomotive Co-Co de fabrication francaise, un des deux types aux Chemins de Fer chinois, de 6000 CV, 138 tonnes.
Der neue französische Co-Co Ellok ist eine der beiden Typen der chinesischen Eisenbahnen; 6000 PS einheit wiegt 138 t.
Nueva locomotora eléctrica francesa Co-Co es uno de los dos tipos de los FF CC chinos; 6000 CV, peso 138 toneladas.

China Gets New French-Built E

With a tremendous portion of its economic energies directed toward the building of new railway lines—some 5000 km of line have been built in the past ten years—and a spectacular increase in industrial production with its resulting demand on existing lines, China is turning its attention to increasing the capacity of existing trackage without costly double-tracking or extensive reconstruction. China's answer is electrification, and the first 25-kv AC locomotives are now entering service.

The first line to be electrified, the 90-km Pao Chi-Fung Shien segment, places gruelling demands on motive power. The relatively short section is almost entirely on heavy grades—27 km of 3.0 per cent grade on one slope, and a nearly constant grade of 2.0 per cent for 41 km on the other. Curves of 300-meter radius are numerous, and with steam power the line has been limited to trains of 500 tons operating at a top speed of 25 km/h. With 15 freight trains and three passenger trains each way daily the line had reached the limit of its capacity.

Electric traction will permit a daily total tonnage of 18,500 in each direction, in addition to five pairs of passenger trains, and average speeds of up to 50 km/h.

To handle the increased traffic the line is being resignalled, semi-automatic block signals replacing the present manual semaphore operation. Open wire communications are being replaced by cable and radio circuits.

For service on this line and others to be electrified, the Chinese Railways have chosen a Co-Co locomotive design suited for mixed-traffic operation, with a weight of 138 tons and a top speed of 100 km/h.

Two types have been built within these specifications. The CC-6 Y 1 series, consisting at present of three locomotives, follows Soviet design and is closely patterned after the N-60 locomotives of Soviet Railways. The 5400-hp units were assembled at Siang-Tan and prior to being placed in service were tested on a 6-km electrified "roundabout" circuit near Peking, patterned after the Soviet "Locodrome" at Tcheriabinsk.

The second series—CC-6 Y 2—consists of 25 6000-hp Co-Co locomotives built in France by the same industrial group that earlier furnished 50 Co-Co freight locomotives for the Soviet Union—a combination of Alsthom and MTE.

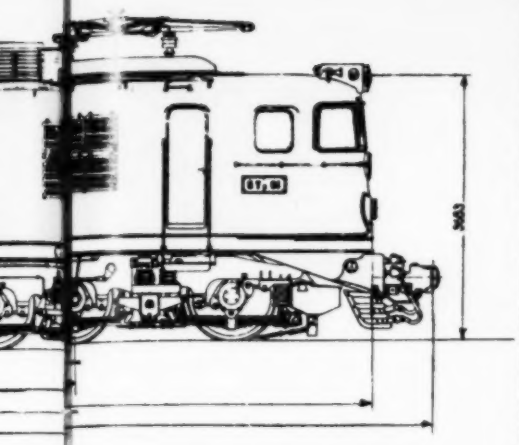
Generally similar to the machines built for the USSR, the AC units for China are fitted for multiple-unit operation and are equipped for regenerative braking. Braking, for the first time, is accomplished by direct excitation of the motors, using silicon rectifiers and magnetic amplifiers. Electrically, with the exception of the regenerative braking installation, the locomotives are essentially like the two-motor and four-motor ignitron locomotives used on SNCF industrial-current lines.

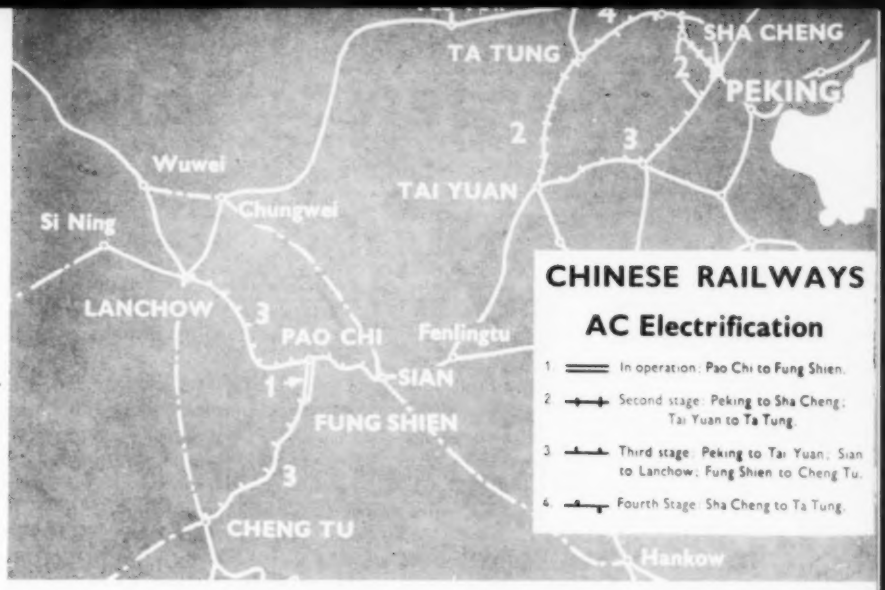
The body, of Alsthom design, is of tubular-beam construction, and has generous cabs of the familiar French panoramic pattern. A widely-varying climate—from —40° to +40° C. temperature range—requires a rugged ventilation system. The French-built locomotives have a 250-ton Henricot automatic air-conditioning installation, and the units are fitted with microfilters.

At 45 km/h on a 2.0 per cent gradient a single unit develops a tractive effort of 37.6 tons and can handle a 1500-ton freight train; two units in multiple will handle the same train at 47 km/h on a 3.0 per cent grade. For passenger service single units will handle a 700-ton train on 3.0 per cent grades at 50 km/h with a tractive effort of 27.7 tons. Regenerative braking installations have been designed to maintain the same speeds with the same tonnage on descending grades; starting tractive effort on the level reaches 60 tons.

The Pao Chi—Fung Shien line will be supplied with current from local 110-kv three-phase lines fed from the 200-mw thermal power station at Sian; power taken from the line does not exceed ten per cent of the station's capacity, and the existing 110-kv lines are closely enough situated to the rail line to present little problem in supplying current. One substation is now in use and a second is to be added. The existing thermal power plant at Pao Chi, with a capacity of only 7000 kw, is to be replaced by a 100-mw installation, and eventually the 110-kv network will be fed by two additional thermal stations and by hydroelectric installations on the Yellow River.

Catenary design for the Pao Chi-Fung Shien line, and presumably for future





Electrification plans have four stages.
L'électrifications 'effectuera en 4 phases.
Elektrifizierungsprojekte in vier Stufen.
Proyectos de eléctrificacion en 4 etapas. ▶

lt Electrics for 25-kv Projects

AC electrification, is identical to that used on Soviet AC lines, based on that used in Germany for 16-2/3 cycle AC installations at 15 kv.

The development of existing thermal generating capacity, and the realization of the hydro-electric resources of the Yellow River (estimated at 33 million kw) and of the Yangtsi (220 million kw), underlie the Chinese Railways plans for future electrification.

Electrification, all on the 25-kv industrial-frequency system, is planned in three stages beyond the first installation from Pao Chi to Fung Shien.

Included in the next stage of electrification are the line from Fung Tai—a suburb of Peking—to Sha Cheng, a distance of 104 km with 1.6 per cent grades (the so-called "Great Wall" line) and the line between Tai Yuan and Ta Tung, with 30 km of 2.2 per cent grades and the balance of the 250-km line varying between 1.2 and 1.5 per cent.

The third stage includes the electrification of lines radiating from the Pao Chi-Fung Shien section in three directions—Fung Shien to Cheng Tu, 570 km; Pao Chi to Lanchow, about 500 km; and Pao Chi to Sian, another 200 km. Also included in this stage of the program is the 500-km Tai Yuan—Peking "Mining Line".

The final stage of the present program would complete a loop by joining Sha Cheng, Kalgan, and Tai Yuan. The next logical stage would be the electrification of the Tai Yuan-Sian section.

Locomotives Electriques pour la Chine

Le développement de l'économie chinoise a permis l'extension considérable des chemins de fer, ces dernières dix années, tout comme l'augmentation du trafic sur le réseau existant. Pour les lignes à densité intensive et de travail dur la solution a été trouvée dans l'électrification. Pour la première ligne de 25 KV CA 25 locomotives Co-Co de 6000 CV ont été commandées en France; les premières sont actuellement en service.

Neue Chinesische Elloks

Chinas wachsende Wirtschaft hat in den letzten zehn Jahren eine enorme Steigerung des Eisenbahnbetriebes zur Folge gehabt. Ebenso wichtig war die Zunahme der Verkehrsleistung auf den vorhandenen Strecken. Für Strecken mit grosser Verkehrsdichte und ungünstigen Betriebsbedingungen war Elektrifizierung die Lösung. Für die ersten 25 KV Strecken wurden 25 Co-Co 6000 PS Lokomotiven in Frankreich bestellt, und die ersten kürzlich in Betrieb genommen.

Locomotoras Electricas para China

La expansión económica de China ha traído consigo una gran expansión de los ferrocarriles en los últimos diez años. En las lineas existentes la expansión de la capacidad ha sido de igual importancia. Para las líneas de gran intensidad y de condiciones defavorables la electrificación soliciona los problemas. Para la primera linea KV CA 25 locomotoras francesas Co-Co de 6000 caballos han sido compradas.

US Mergers: "Slow Progress"

From the great amount of publicity generated in recent months, it would appear that most railways in the United States are about to lose their separate identities and be merged into large new combinations. Actually, such is not the case; fewer than 25 railways are presently engaged in merger studies and only three larger mergers, involving six railways, have been consummated in recent years.

One reason the merger idea has gained such prominence is the size of the railways involved. Many of the important lines are included. Moreover, since these railways are privately controlled, and each has many stockholder-owners, the facts in each case are made known widely. Unusual publicity is a natural result.

It should be noted, in the first place, that mergers are not a new development in the United States. Most of the present systems were created by the bringing together of many short lines. This development was largely finished before 1920, however, and since that time most of the present lines have operated as they do today.

During the 1930's there were numerous studies of possible railway consolidations, most of these studies being conducted by agencies of the Federal government. But none of these plans was implemented. Then, in 1940, the government returned to the railways themselves the initiative to propose mergers subject, in each instance, to approval by the Interstate Commerce Commission, a Federal agency.

The advent of World War II, and the subsequent years of relative prosperity, pushed merger ideas into the background. It was not until 1958 that various rail lines began to show renewed interest. Since then interest has expanded swiftly.

Several reasons lay behind this change. Motor trucks, encouraged by great highway-building programs among other factors, continued to make significant gains in freight tonnages; the air lines moved into more prominent roles as passenger carriers. Increased dispersion of industry resulted in basic changes in freight haulage requirements, notably smaller volumes from points of origin and shorter hauls. Continued regulation of freight rates, the increased cost of equipment replacement and plant renewal, and higher taxes in most areas—all these combined to push railway revenues lower and reduce earnings.

Mergers promise hope of relief from many of these conditions. By combining two or three systems into one, duplicate facilities can be eliminated, terminal delays between separate railways reduced, and substantial operating savings achieved. Thus merger interest has increased, looking toward these goals.

Present studies are not limited to any section or region of the United States. The railways in the Eastern region, with generally shorter hauls and more terminals, have been hardest hit in the postwar competitive years; yet some of the larger merger proposals advanced in the past 12 months have involved railways in the South and West as well. All of the various systems, together with the present status of their plans, are listed in the accompanying table.

It cannot be assumed that all of these proposals will come to fruition, however. The procedure for merging two or more railways into a single system, or even the method by which one railway acquires control of another, is a slow one, subject to many pitfalls.

For example, if two railways agree to the merits of a merger scheme, the management of each must conduct extensive operating studies to determine the values, if any, to be derived. If initial findings are favorable and agreed upon, the managements must next seek approval from the shareowners. This normally is handled in separate meetings of stockholders on the railways involved. A favorable vote by as many as two thirds of the total ownership may be required in some companies, although a simple majority is the general rule.

Even after the owners have given their endorsement, a merger proposal faces added delay before it can be consummated. All railway matters of this type must, by law, be submitted to the ICC for study and ultimate approval or disapproval.

In addition to consideration of the merger plan by its own staff, the ICC conducts public hearings to offer interested parties, including competitive railways or other carriers, an opportunity to state their views. Opposition from other railways, or from local communities, or from labor unions, is to be expected. While such opponents have not halted recent mergers, they have been able to obtain conditions more favorable to their interests, for example, the imposition of labor-protective provisions, the retention of existing traffic connections at "gateway" cities, or the continuation of a particular service which the merged railway system might have wished to discontinue.

Assuming ICC approval is eventually obtained—and the time required may range from several months to a year or more—a final recourse is still available. Should opponents wish to use it, they may bring the issue to the Federal Courts. Action can be initiated to halt or delay an ICC-approved merger plan. These judicial proceedings, if progressed through the several Courts, can consume still more months or years.

In short, the matter of combining railways is neither simple nor swift in the United States. How successful the various plans now pending will be only time will tell.

Fusionnements

L'abondante publicité diffusée ces derniers mois pourrait suggérer que la plupart des sociétés de chemins de fer aux Etats-Unis seraient sur le point de perdre leur indépendance et se fusionneraient dans de grandes sociétés nouvelles.

Zusammenschluss

Aus den vielen Veröffentlichungen der letzten Monate könnte man schliessen, dass die meisten Eisenbahnen in den Vereinigten Staaten im Begriff sind, ihren Privatcharakter zu verlieren und zu neuen Gesellschaften zusammenzuschmelzen.

Fusion en los EEUU

En los últimos meses se ha publicado mucho sobre fusiones y parece que la mayoría de los ferrocarriles en los EEUU estén para perder su independencia a unas nuevas entidades. Sin embargo, no correponde a la realidad.

RAILWAY MERGERS IN U.S.A.

RAILWAY	Km (Miles)	PRESENT STATUS*	COMMENT
Erie	3,785 (2,352)	Merger completed 16 Oct. 1960	Dispute over labor protection pending in federal court
Delaware, Lackawanna & Western	1,514 (941)	"Erie-Lackawanna R.R."	
Chicago & North Western	14,932 (9,280)	Merger completed 23 Oct. 1960	C & NW absorbed M & StL
Minneapolis & St. Louis	2,238 (1,391)		
Norfolk & Western	3,440 (2,138)	Merger completed 1 Dec. 1959	Operations were integrated 1960
Virginian	978 (608)	"Norfolk & Western"	
Norfolk & Western including Virginian	4,413 (2,743)	Preliminary studies completed; will seek government approval in 1961	N & W and Wabash already owned in part by giant Pennsylvania R.R.
New York, Chicago & St. Louis	3,492 (2,170)		
Wabash	3,849 (2,392)		
Baltimore & Ohio	9,511 (5,911)	Separate C & O, NYC plans pending before Interstate Commerce Commission	C & O, NYC each seek control of B & O. C & O opposes 3-way merger
Chesapeake & Ohio	8,241 (5,122)		
New York Central	16,682 (10,368)		
Great Northern	13,335 (8,288)	Studies completed; railways will seek government approval in 1961	Combined system would be largest in U.S.A.
Northern Pacific	10,996 (6,834)		
Chicago, Burlington & Quincy	13,950 (8,670)		
Spokane, Portland & Seattle	1,506 (936)		
Missouri Pacific	15,146 (9,413)	Proposal announced recently; in initial stages only	MP seeks control of C & EI
Chicago & Eastern Illinois	1,389 (863)		
Soo Line, including Wisconsin Central	6,735 (4,186)	Pending before ICC; public hearings completed	Canadian Pacific seeks to consolidate subsidiaries in U.S.A.
Duluth, South Shore & Atlantic	875 (544)		
Western Pacific	1,915 (1,190)	New proposal—SFe and SP each buying WP stock in open market	Dispute between SFe and SP will probably be settled by ICC
Santa Fe	20,869 (12,970)		
Southern Pacific	12,846 (7,984)		
Atlantic Coast Line	8,463 (5,260)	Studies completed; application for merger approval now before ICC	Name of new railway would be Seaboard Coast Line System
Seaboard Air Line	6,673 (4,147)		
Chicago, Rock Island & Pacific	12,106 (7,524)	Joint studies continuing; still in initial stages	New system would blanket western U.S.A.
Chicago, Milwaukee, St. Paul & Pacific	17,054 (10,599)		
Southern	12,463 (7,746)	Application to acquire CofG filed with ICC by Southern	Southern would buy CofG stock, now owned by St. Louis-San Francisco
Central of Georgia	2,808 (1,745)		

* As of 1 Dec. 1960

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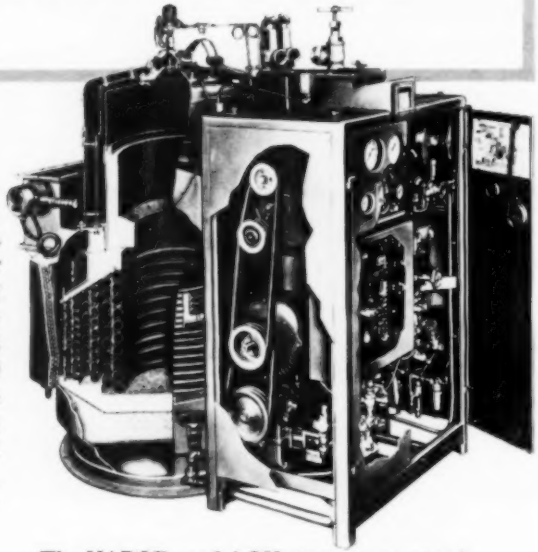
serving railroads for over 50 years



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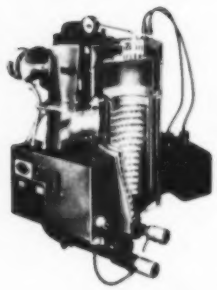
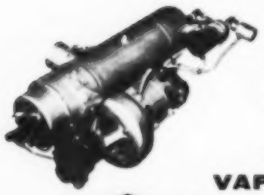
The VAPOR model OK steam generator is light, robust, reliable and compact. Statistics of OK-4616: sustained output—750 kg/h; weight—1,350 kg; overall dimensions—165 x 110 x 160 cm. Similar models available with outputs ranging from 225 to 2,000 kg/h.

The VAPOR Thermostat shown here is one of the models designed for railroad heating and air conditioning systems. VAPOR Thermostats manufactured to rigorous standards flatten the curve of temperature variation to within one degree centigrade.



EQUIPMENT MADE IN HOLLAND

Also illustrated is the compact VAPOR W-120 Circulating Water Heater (approx. 115 kg and 70 x 40 x 48 cm, with 32,000 kg Cal/h output) for heating diesel railcars and locomotives. Automatically maintains temperature of engine coolant to assure full operating efficiency.



Also available for lower heat output requirement the B-70 heater with a capacity of 16,000 kg. Cal.

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were changed to 83 1/3 cycles AC, and cable communication lines installed.

Existing DC trainsets are being converted for use on the line; at the time of the changeover 30 three-car sets had been converted, and while the remaining DC stock is being converted new AC sets built for other lines in the area but not yet in service will be used on the Southend line. Modification of the DC equipment includes installation of transformers and rectifiers, and the modification of the 1500-volt traction motors to accommodate current with AC ripple.

Other work on the Eastern Region out of Liverpool Street was completed when AC service was introduced on suburban lines to Chingford, Enfield Town, Hertford and Bishop's Stortford on 21 November.

On these lines 25-kv current is used on the outer sections, with London trackage close to Liverpool Street using 6.25 kv. Adopted to reduce the problems of providing electrical clearance, the use of two voltages requires a neutral section consisting of four gaps so that locomotives or trainsets with varying pantagraph spacings will not bridge two sections of different voltages.

To prevent pantagraph arcing when passing from live to dead sections of line, permanent magnets installed in the track on either side of the section operate a receiver in the traction equipment which automatically opens the circuit breaker while passing through the changeover section. The breaker is opened by the first magnet; the second allows automatic voltage-detection equipment on the traction unit to set the changeover switch for the new voltage, and closes the breaker.

Although it was not visited as part of the official conference program, the Glasgow suburban electrification was discussed. Opened on 7 November, the Glasgow scheme is centered on Queen Street station, and serves Helensburgh, Balloch, Milngavie, Springburn, Airdrie and Bridgeton.

Work on these lines involved the reconstruction of 65 overbridges, the raising of 19, and the lowering of track under another 28. As much of the track in central Glasgow is in tunnels, 6.25 kv current is used in this section. Three-car MU trainsets are used; the sets have a tare weight of 126.8 tons and a continuous rating of 830 hp. Sets seat 236 passengers.

During the conversion process the heavy traffic density, and the necessity of maintaining regular service, imposed considerable problems. In each case, however, electrification has made possible faster and more frequent service.

Olympics: Big Transport Job

Add 200,000 extra visitors to a normally heavy summer season, and you place an unusually severe burden on all transport. That figure is the official estimate of attendance at the 1960 Olympic Games in Rome, and for the Italian State Railways (FS) the Olympics—coming at the peak of the annual holiday traffic—meant months of detailed planning and weeks of constant effort during the games themselves.

In making its plans for the influx of visitors, the FS established a committee to coordinate railway preparations with all Italian agencies involved, and with connecting European railways. A number of itineraries were established by which additional trains could be routed to Rome within existing timetables, and at a meeting held in Rome with representatives of the other railways concerned a timetable for extra international trains was established. Altogether the period between 17 August and 12 September saw 26 additional international trains arriving in Rome, and another 24 departing—a total of 487 coaches and some 30,000 travelers.

In addition to trains arriving from France, England, Germany, Switzerland, Denmark, Poland and Yugoslavia, the Olympics required 89 extra trains within Italy itself: 53 trains with a total of 420 coaches arrived in Rome; 36, with 260 coaches, departed. These additional domestic trains accounted for another 50,000 passengers, and 31 special trains of empty equipment were operated to keep rolling stock available.

The bulk of the Olympic travel, however, was handled on regular trains with added equipment—an estimated 190,000 passengers and 3276 extra cars.

Altogether, 170 extra trains were operated; coaches for these and those added regular trains totalled 4443; and an estimated 271,000 travelers were carried during the 27-day period.

With Italy's passenger rolling stock almost completely absorbed by normal holiday traffic, the provision of cars for the Olympic traffic presented special problems. From the start of the planning, close co-operation was established with other European railways to assure sufficient equipment for the international trains.

In addition, the Swiss Federal Railways delayed the shopping of some equipment to provide extra cars for the FS domestic services, and France's SNCF also provided additional equipment. Germany also provided help by supplying its own equipment to release FS coaches normally used in international service between the two countries.

If a gold medal had been awarded for transportation, it would without doubt have gone to the Italian State Railways.

Trafic olympique

Les jeux olympiques de 1960 ont exigés de la part des Chemins de Fer italiens un travail soigneux d'élaboration de plans et de coordination.

Olympischer Verkehr

Die Olympiade 1960 verlangte von der italienischen Staatsbahn sorgfältige Planung und Zusammenarbeit.

Tráfico Olímpico

Para los ferrocarriles del estado italianos los Juegos Olímpicos de 1960 requerían una planificación y coordinación escrupulosas.

JAPAN: Japan's private railway corporations have announced plans to place a new fleet of high-speed express trains in service, to meet competition for the commutation and summer tourist traffic. The Tobu line will put a new six-car train, the "Kegon", in service on its Nikko line in competition with the Japanese National Railways. The train will be fully air-conditioned, and is to have a top speed of 164 km/h. The Odakyu line will place new 4-car "HE" trains in commuter service, while the Tokyu, Seibu, Keihin, and subway lines plan to add new stainless steel equipment.

VENEZUELA: The minister of communications, Dr. J. M. Domiguez Chacin, has announced plans for a railway line connecting the petrochemical works at Moron and the copper mines at Aroa; another line is proposed from Moron to the Riecito phosphate deposits.

RHODESIA: Rail traffic over the Rhodesia Railways from the Congo province of Katanga has risen 40 per cent since July. Internal difficulties in the Congo have largely closed the Port Franqui-Leopoldville-Matadi route formerly used by much of the copper and zinc traffic.

ITALY: Completion is near of the double-tracking of the Italian State Railways line between Gallarate and Arona on the Milan-Domodossola (Simplon) route. This section was the only remaining single track portion between Milan and the Swiss frontier. An opportunity has been taken to ease some of the sharpest curves and reduce some of the gradients to permit the operation of faster and heavier trains. The route is electrified on the Italian State Railways standard 3.000-volt DC system.

BULGARIA: A shortage of railway cars prevented a substantial portion of the apple harvest in the Kamchia region from reaching market, the newspaper *Trud* reported.

SOVIET UNION: The USSR Institute of Scientific and Technical Information is planning to introduce in 1961 a monthly journal of abstracts on transportation, providing a thorough review of more than 2000 specialized journals from throughout the world.

GREAT BRITAIN: British Transport Commission traffic receipts for the more than 40 weeks ending 9 October were nearly £21 million more than for the corresponding period of 1959; British Railways revenues accounted for more than £15 million of the increase, with total receipts of £358,459,000. Rail operations of London Transport Executive brought in revenue of £19,819,000 compared with slightly over £18 million in the first three quarters of 1959. Railway freight receipts were up nearly £7 million.

AUSTRALIA: An agreement has been signed between the South Australian Railways and a local road transport firm for the operation of Flexi-Van equipment between Adelaide and Melbourne. This is the first time an Australian railway system has undertaken to operate specialized piggy-back equipment. Initial plans call for the adaptation of four flatcars to handle the equipment and it is confidently expected that following a trial period, the system will be greatly expanded and extended to other routes.

GREAT BRITAIN: The first of the two new one-class ships for the Weymouth-Channel Isles service has been completed for British Railways, Southern Region. Called the "Caesarea", she will be joined in May by the second new vessel, the "Sarnia", and by the reconditioned "St. Patrick". The "Caesarea", built by J. Samuel White & Co. Ltd., is a twin-screw turbine-driven ship of 4.174 gross tons and has a capacity of 1400 passengers. Designed speed is 20 knots. She is equipped with Denny-Brown stabilisers and a bow rudder. The latter, as well as the aft rudder, are operated by rotary vane type steering gear of AEG manufacture.

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World Market CONTINUED

▶ *Pullman Car Co. Ltd. (Great Britiain)*—Will receive eight 24-seat first-class parlor cars, 13 20-seat kitchen cars, seven 42-seat second class parlor cars, 15 30-seat kitchen cars for second-class service, and one 24-seat bar car. The cars, being built by Metropolitan-Cammel, will replace existing equipment on the Eastern, Northeastern and Scottish regions of the British Railways.

▶ *Queensland Railways.*—Asked for bids for construction of line deviations on the Mount Isa-Townsville Railway Project between Haughton and Burra Ranges. The contract, valued at approximately £1,000,000 (Australian) (U.S. $2.25 million), covers excavation (125,000 cu. yd.); rock excavation (500,000 cu.yd.); embankment construction (460,000 cu. yd.); trackwork, 3 ft. 6 in. gauge (12 miles); culverts, fencing and other related work.

▶ *RENFE (Spanish National Railway Network)*—Will receive 234 broad-gauge two-axle ballast carrs ordered earlier from Werkspoor N.V. The cars will be semi-permanently coupled in pairs. Construction is to begin in early 1961.

▶ *Soviet Railways*—Have ordered a prototype 2400-hp diesel-hydraulic locomotive from Maschinenbau Kiel (MAK.) If performance is satisfactory further orders are contemplated.

▶ *Sudan Railways*—Have received bids for 23 pressed steel coach underframes and 35 bogie freight car underframes, for operation on 1.067-meter track.

▶ *Sudan Gezira Board*—Will place orders for 18 120-hp mainline diesel locomotives; 16 80-hp mainline diesels; 14 shunting diesels; 580 bogie steel flat cars of 9-ton capacity; 3 bogie steel-and aluminum closed cars, 9-ton capacity; 125 all-steel 9-ton bogie closed cars; 6 water tank cars of 7600-liter capacity, bogie construction; 15 oil tank cars of similar capacity and construction; 28 bogie brake vans; 8 motor inspection trollies; and 26 pump trollies. The equipment is to be used on a new 225-km light railway system to be built in connection with completion of the Managil Irrigation Scheme south of Khartoum. (see "World Bank", IRJ October 1960, p. 73).

Coming in IRJ.....

- German Federal Railways: the 126th year
- Railway of the Month: Thailand
- Mass-Transit Research Laboratory
- Planning for Microwave Communications

.....and railway news from around the world

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February 1961

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Australia: End in Sight for "Gauge Battle?"

The gauge problem that has bedevilled the railways of Australia for over half a century may be coming to an end, at least insofar as through transcontinental traffic is concerned.

This, at least, was the view of some Australian railway observers when Western Australia Government Railways announced the opening of negotiations with the Commonwealth government for the construction of a standard-gauge line between Kalgoorlie (junction with the standard-gauge Commonwealth Railways) and Perth, at a cost of £A 35 million.

As the announcement was made a decision was also being awaited from Canberra on the standard-gauging of the South Australia Railways' segment between Port Pirie and Broken Hill, and the construction of a new standard-gauge line from Port Pirie and the capital city of South Australia, Adelaide.

The gauge problem has been a persistent headache to Australian railwaymen and shippers since the federation of the various states in 1901. Three different gauges are in use—standard, narrow (1.067 meters) and broad (1.60 meters)—and only two adjoining states, South Australia and Victoria, share a common gauge—1.60 meters.

A major factor underlying the two projects appeared to be the plans of Broken Hill Proprietary Company, one of the world's largest steelmakers, to establish a mill at Kwinina, near Perth. Without through standard-gauge transport of materials, BHP is reported to feel that the project would not be economically feasible. The line of the Commonwealth Railways, linking Port Pirie and Kalgoorlie, is already standard gauge.

The proposed Broken Hill-Port Pirie project would still further complicate matters for the SAR, at least for the present, by introducing a third gauge into a system that now has both narrow and broad-gauge lines. SAR is, however, anxious to include all of its narrow-gauge lines except for an isolated section (which does not have rail interchange) in the project.

Together with the existing standard-gauge line between the New South Wales Railways and Brisbane, capital of Queensland (whose own railways system is narrow gauge) and the now-building standard-gauge line between Melbourne, on the broad-gauge Victoria Railways, and the NSW system the new projects would provide standard-gauge connections between the main cities of all five mainland states, though only an indirect route would be available between Melbourne and western points.

After Hours with Jim Lyne

MOTIVES—Is the manager of a privately owned railway interested exclusively in earning dividends for his shareholders or, on the other hand, is the operator of a publicly owned railway concerned only with providing satisfactory service to the public?

From my observation, I would have to answer "no" to both questions. The managers of publicly-owned railways whom I have observed are concerned with the competition of highway, water and air transport—in exactly the same way and to the same degree as are the managers of company-owned railways. Both of them seek, insofar as possible, to earn a profit from the operation of the properties under their direction—regardless of whether the owners are shareholders or the government. Both have a professional pride in the quality of their work and the efficiency of operation of their properties.

I would say that there has developed a type of professional careerist in railway management, who is remarkably similar in motives and action—as between countries, and as between privately and publicly owned railways. There are exceptions, of course—but they are infrequent.

SALESMANSHIP—Perhaps the least developed area of railway managerial skill, whether railways are privately or publicly owned, is in merchandising railway service. It is only natural that this should be so since, until recently, railways in most countries enjoyed a near-monopoly of internal transport. Their problem was one of finding means to move the traffic, not of finding traffic to move.

Now, in many countries, the urgent necessity is all the other way—railway managers have to learn marketing and salesmanship.

In one large country (not in North America) an equipment manufacturer confided in me as follows: "To assure the future of our manufacturing business, what we must do above all else is to teach salesmanship to our railwaymen. The need for it is new to them, and the very best of them have much to learn."

STATION NAMES—Place names (towns or rivers which give their names to railways and railway stations) have long interested me. In North America there are many such names that, being Amerindian in origin, are unusual. One category, particularly, attracts me—the Indian names ending in a vowel and with more accent on the last syllabe than on the penult— such North American place names as *Wichita*, *Pembina*, and *Arkansas* (in which the final *s* is silent).

I recently encountered a couple of such names, also of Indian origin, in Brazil—Guaratingueta and Barra do Pirai. The first of these, to me, is a short poem in itself. Is there anywhere in the world a more euphonious place name? If you know one, please tell me so I can print it (and please be sure to include instructions as to pronunciation if the spelling is not patently phonetic).

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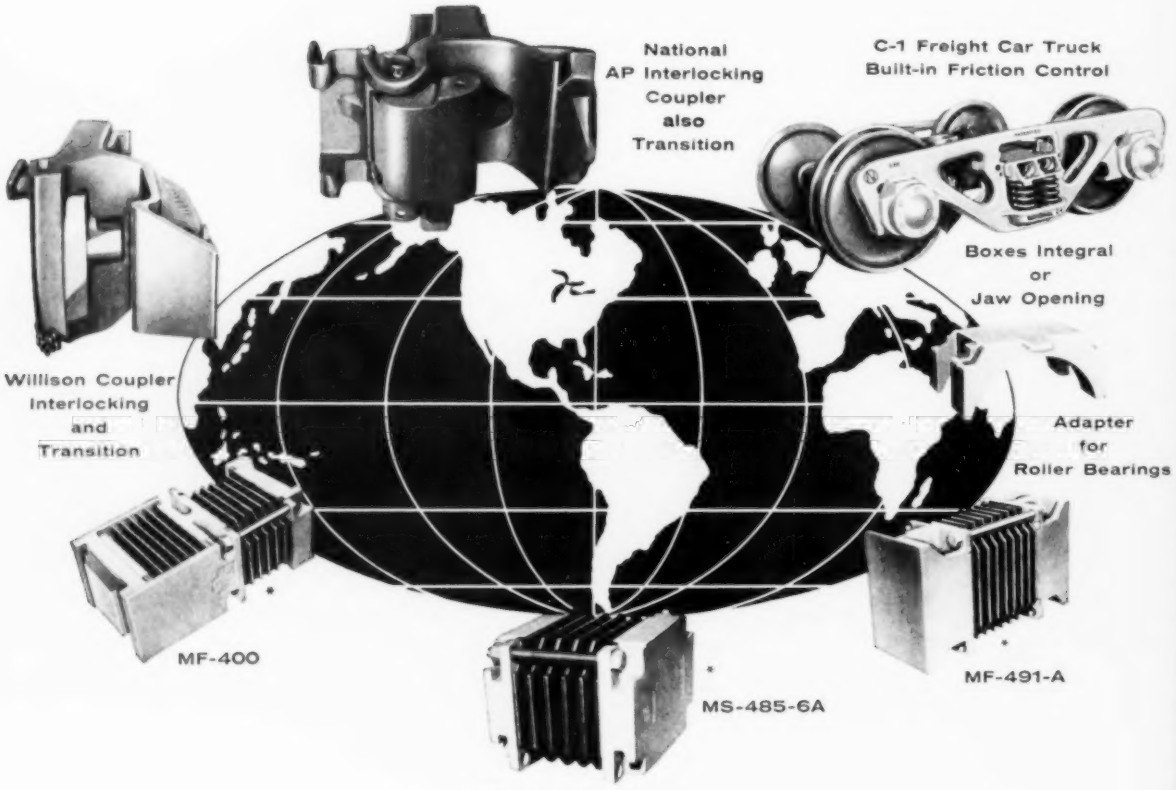

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